



FRIDAY, MAY 13.

## NEWS OF THE WEEK.

We give below, in a condensed form, the leading news items of the week. These items will be found in detail in their appropriate columns.

**Meetings Next Week.**—Chicago, Burlington & Quincy; Flint & Pere Marquette; Puget Sound Construction Co.

**Elections.**—Carolina, Knoxville & Western, C. Phinney President.—Central of New Jersey, J. R. Maxwell, President.—Central of Georgia, W. P. Savage, Superintendent.—Detroit, Monroe & Toledo, John Newell, President.—East Tennessee, Virginia & Georgia, C. H. Hudson, General Superintendent.—Erie, Butler & Pittsburgh, F. W. Huidelkoper, President.—Louisiana & Missouri River, W. H. Bliss, President.—New York Railroad Commission, W. E. Rogers, Isaac V. Baker, Commissioners.—Texas Trunk, John L. Henry, President.—Toledo, Ann Arbor & North Michigan, Henry W. Ashley, General Manager.—Vincennes & New Albany, Edward Watson, President.

**New Companies Organized.**—Bocca Grande is incorporated in Florida.—Carolina, Knoxville & Western is organized in Tennessee.—Columbus & Maysville is incorporated in Ohio.—Counseaut, Jamestown & Southeastern is incorporated in Ohio.—Erie, Butler & Pittsburgh obtains charter in Pennsylvania.—Newport & King's Valley is incorporated in Oregon.—Pacific State Line files articles in Colorado.—Pittsburgh, Calamine & Newport is incorporated in Kansas.

**Changes and Extensions—Colorado.**—Atchison, Topeka & Santa Fe is building from Pueblo, Colorado.—**Dakota:** St. Paul, Minneapolis & Manitoba completes Bottineau branch.—**Illinois:** Cairo Short Line will be extended to Creal Springs and Paducah, Ky.—**Indiana:** Midland road is opened to Lebanon.—Vincennes & New Albany is to be built from Vincennes to New Albany.—**Indian Territory:** Kansas, Arkansas Valley & Fort Smith begins work from Wagner.—**Kansas:** Chicago, Rock Island & Pacific has 80 miles of Wichita extension completed.—**Kentucky:** Ohio Valley road is completed to Marion.—**Missouri:** Chicago & Alton is building west from Odessa.—Current River begins work from Willow Springs.—**Ohio:** Lancaster & Hamden begins survey.

**Personal.**—Died, J. M. White.

**Leases and Sales.**—Addison & North Pennsylvania is sold.—Chattanooga road is sold in Kentucky.—Cincinnati & Southeastern was sold on May 7.—Kentucky & Great Eastern was sold on May 7.

**Traffic.**—Anthracite coal shipments for the week ending May 7 show an increase of 7.1 per cent., as compared with corresponding week last year; bituminous shows increase of 72.8 per cent.; coke, for week ending April 30, shows increase of 23.7 per cent. Cotton receipts, interior markets, for the week ending May 6 show decrease of 65.6 per cent., as compared with corresponding period last year; shipments show decrease of 57.5 per cent.; seaport receipts show decrease of 66.5 per cent.; cotton in sight is less than at same period last year by 43.0 per cent.

**Earnings.**—For the month of April, 31 roads report gross earnings, 26 showing an increase and 5 a decrease for the month.

**Annual Reports.**—Atchison, Topeka & Santa Fe and Southern Kansas systems, for the year ending Dec. 31, 1886, show an increase of 2.6 per cent. in gross earnings and 1.5 per cent. in net.—Michigan Central, for the year ending Dec. 31, 1886, shows a gain of 14.8 per cent. in gross earnings and 44.5 per cent. in net.

**Miscellaneous.**—Work is resumed on the Hudson River Tunnel.—Combination of roads to select uniform coupler.

## Contributions.

## Draft Gear.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Now that the car-builders and master mechanics have their "congress" in good working order, and that its decrees and standards, being well considered and wise, have been respected and very largely adopted for some time back, as emanating from a competent authority, I think it is time that the whole method of attaching draft gears should be agitated afresh and taken up by our master car-builders. I do not refer to the coupler or drawhead link, or any other one part, but to the draft gear as a whole. Below is a sketch greatly exaggerating the evil I wish to point out, so as to make it clearer:



The sketch is meant to represent the tender and first three cars of an average train. Now, let us suppose that the engine is backing, or holding back the cars so that the draft springs are all compressed. As long as the pressure is not sufficient to overcome the resistance of the spring, the line of pressure is along the wavy dotted line, from draw-heads, through draft timbers and fastenings to the sills and back again. The fastenings should be amply strong enough to stand what the springs can support; when, however, the strain becomes too great for the draft springs, or in case of running together of the cars, as in coupling, causing sudden blows, the dead blocks come together, taking up the strain in a di-

rect line with the sills. The car sills are then under direct end pressure. This is as it should be, a mechanical job; the sills are really columns with the load directly on their ends: the whole thrust of the train is in a straight line. Thus as long as the dead blocks are in their proper places the draft springs, timbers and bolts cannot be unduly strained unless splintered by too heavy a blow. The material, timber, is better suited to stand a compressive strain than to stand tensile or cross-strain, so that it is well adapted to the work it has to do.

When we, however, consider the case where the engine is pulling the train, the relation of the design (or want of design) to the work done is just as unfavorable as in the previous case it was favorable. First of all no one worth the name of a mechanic or engineer would design any machine or truss, with members of wood, to stand tensile strains such as these car sills have to stand, any more than he would make a locomotive with wooden main or side rods. Secondly, the pull is always along the wavy dotted line, as sketched above; no matter how heavy a pull or how hard a jerk, it all has to go through the draft timbers, bolts and sills. Thirdly, the front draft gear has to pull the whole train, a load of anywhere between say 500 tons and 1,800 tons. Furthermore, the strain on the fastenings is different when the engine is pulling from what it is when she is pushing, tending, like constantly bending a wire backwards and forwards, to work the fastenings loose and finally break them.

The remedy is to my notion right at hand, has been used by some roads for years, is simple, direct and mechanical, viz., the continuous draw-bar. Suppose in the above sketch all the draw-bars are connected together with long rods under the cars making a straight line for the pull from one end of the train to the other. The whole train can then be considered as a chain made up of long links, each link carrying a car and no more. The pull would then be through, wrought iron link pins, draw-heads and draw-bars in a direct line. The rear spring of each car pushes the car along while the front spring is inoperative and the only load that can come on to a draft spring is that due to its own car body. The strains on the draw-bar bolts and other fastenings are always compressive, never pulling, thus doing away with the working backwards and forwards which causes so many loose draft timbers. It has always been a mystery to me why master car-builders should go on building cars by the thousands, improving them in almost every conceivable way to adapt them to the heavier loads and longer trains, but still perpetuating this bungle, while the breaking loose of trains every day all over the country is a constant proof positive that the draft gear is too weak for the work it has to stand and the repair yards and side tracks are never without broken down cars standing on them, with draft timbers gone and whole ends pulled out. I would much like to see some of our master car-builders and master mechanics, who have been using properly constructed continuous draw-bars, come forward and state what proportion their draw-bar repairs bear to their whole car repair account and what the additional first cost is; also if breaking loose is as common with them as with old way of pulling through the sills. I am perfectly well aware that I am not airing any new ideas, but it seems to be one of those reforms that have flashed in the pan a time or two but never gone off. If it simply needs some one to start the ball a rolling, here is my push, and I hope some better men will follow me up and the master car-builders take the matter up in the association and recommend a standard continuous draw-bar, or at least standard sizes of rod, buckle, lays, springs, etc. It is not half so complicated a question as the coupler or brake question, and I think needs immediate attention.

R. P. C. S.

## The Staff System.

TRENTON, N. J., May 9, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The article by Mr. E. B. Ivatts, in your issue of May 6, upon the staff system of moving trains on single track, with your remarks thereon, is very interesting.

There are two points that at once occur to the "American" mind in this connection.

First.—When the circumstances of the traffic are such that the staff happens to be at the end of the staff section which has no train to forward for some hours, and there is a train at the other end ready to proceed, what can be done to avoid delay.

Second.—In the operation of a short section of the road, by a person located thereon, is there not a tendency to the moving of trains strictly in accordance with the time at which they are ready to move, without regard to their relative importance.

Some light as to how these points are met will be of value.

J. A. ANDERSON.

## Welded and Upset Eye-Bars.

MONTRÉAL, May 7, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of the 6th inst. Mr. James L. Randolph, consulting engineer, asks, "Do upset eye-bars show better results?" I would like to know what results have been obtained in striking welded eye-bars with a hammer while under a strain of 20,000 lbs. per square inch. I have tested a great many bars in this manner under a strain of 18,000 lbs. per square inch, and I must say that bars showing defects under such conditions would not pass muster before the most casual inspection in any shop. It is a question whether such a test improves a perfect weld, and at all events the method is certainly most unscientific.

Instead of testing bars to a proof strain of 18,000 or 20,000 lbs. per square inch, the method adopted recently, since the introduction of large testing machines in the several large shops in the states, of testing a number of bars to destruction, is certainly more satisfactory. However, as welded eye-bars are not used for first class work by any reputable concern; that is, bars with heads welded to the body of the bar as used by the Baltimore & Ohio, a comparison of the merits of the two kinds of bars would be uncalled for.

J. W. SCHAUER.

## Explosions and Detonations.

PORT MOODY, B. C., April 28, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Kindly answer and explain the following:

Is it true that the force of an explosion of dynamite, giant powder or indeed any of the nitro-glycerine compounds acts vertically? If true, does it exert greatest pressure downwards?

If above be true, please explain the rational of the phenomenon; why does dynamite when exploded differ from gunpowder, since like gunpowder the pressure is produced by the rapid disengagement of a large volume of gas under the action of heat due to chemical combination?

Why does dynamite explode better by the use of a detonator than by a match, for by either heat is applied?

G. S. H.

[Some notes on the action of gunpowder and the high explosives will be found in the editorial columns.]

—EDITOR OF THE RAILROAD GAZETTE.]

## Freight Classification and Rates.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your editorial, entitled "Freight Classification and Rates," in your issue of May 6, suggests certain thoughts which we desire to submit for your consideration and that of your readers.

The article to us seems inconsistent in certain particulars. It says:

"A railroad has important public responsibilities. It is desirable, both for the public and for the railroad, that different shippers should be put, as far as practicable, on an equality. Nothing can be more short-sighted than for managers to pursue a policy which shall result in crushing business competition, and building up a few firms strong enough to dictate terms to the railroad company."

It then proceeds to defend the very classification which charges small shippers from 25 to 66 per cent. more than those who ship in car-load lots.

It assumes that a uniform classification as regards quantity is "paternal" to the small shipper. Is it not much more appropriate to call such a discrimination as the above "paternal" to the large shipper?

It assumes that those who complain of the new classification are unreasonable and do not want to pay the railroads a fair price for doing the business. This is incorrect. They are willing to pay a higher price if all are obliged to do the same. The new classification tends to prevent the small shipper from choosing in what market he will buy his goods, and deprives him of the benefit of the competition of the various wholesale markets for his trade.

The writer of the article seems to forget that one of the objects of the enactment of the Inter-state Commerce law was to prevent unjust discriminations in the form of rebates and draw-backs to large shippers. It is just as bad to bear such discriminations in the form of "classification" as it is in the form of "rebates." In point of fact, the old trunk line west-bound classification worked admirably on articles where no rebates were allowed and where no distinction was made between car-loads and lesser quantities.

The article under consideration says: "Simple, uniform and public rates have long been demanded, are what the Inter-state law was framed to secure, and what the new classification promises." The new classification would certainly be more "simple and uniform" if not split up into a quantity qualification on many articles. The trunk lines have already receded from their position on sugar. The Southern lines have refused to adopt the quantity discrimination feature; why not avoid this troublesome question by dropping out the quantity discrimination on all articles, and fix a uniform rate which would compensate the roads fairly?

The small shippers far outnumber the large ones, their votes had more to do with conferring the franchises under which the roads exist, if riot or trouble occurs they are called on to protect railroad property; should they not be given the benefit of a doubt where a public principle is involved?

MERCHANT.

## Rail Sections.

LONDON, April 26, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am afraid I am getting too troublesome a customer, but as the discussion on rail sections, from Mr. Matte's paper, seems to flourish in your columns, you may, perhaps, grant me a little space.

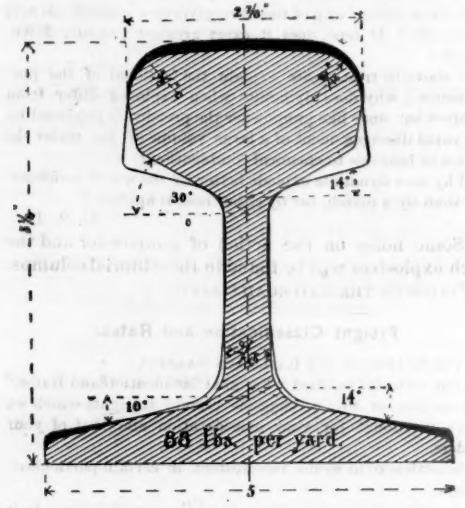
Your leading article in your issue of April 15, with criticism on the rail sections, deals with the thickness of the web and shows that my sections are thickest in the web, for which I will now give the reason, and try to show that, from the engineering point of view, it is needed, not only for stiffness, but also for abrasion. There is no difficulty in the way of rolling sections with thin webs.

In designing my heavy sections, my aim was to obtain as good a road with flanged sections as the English roads with their double heads and chairs. The thickness of web on English roads varies from  $\frac{1}{4}$  to  $\frac{1}{2}$  in. for their 80 to 90-lb.

sections. The roads may be called hard or rigid, but they are perfect and level, and keep so, the elasticity being got with springs and India rubber to smooth the running for passengers. If a heavy blow requires a heavy anvil, and our light engines require such a web and railhead, how much more heavy an anvil would be required for your heavier engines.

You refer to Baron von Weber's experiments to determine the thickness required in the web of rail, republished from your own journal of 1870. As I have had the opportunity of discussing verbally this question with him—we having been intimate friends—I need have no hesitation in making public my views on these experiments, and I am not wanting in respect for his memory.

The accuracy of the experiments I cannot deny, but the conclusions that the web should be as thin as it could be



99-Pound Section.

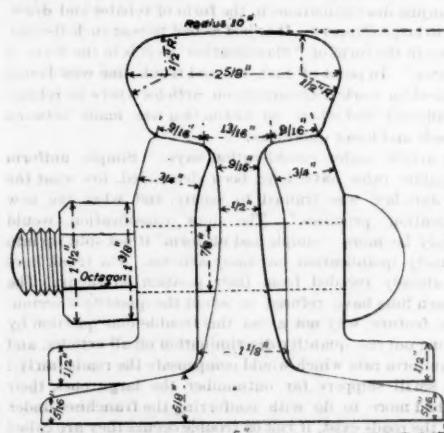
Proposed by Mr. M. N. FORNEY.

rolled are all wrong. A web of  $\frac{1}{2}$ -in. thickness may, in a few trials in testing machines, regain its position, as well as a rail with such a thin web placed near a turn-table for a short time. But where would this rail be in a run on a main line, after hundreds of thousands of charges by running trains at high speed? Is it likely it would regain its original level as would the web of  $\frac{1}{2}$ -in. thickness.

Again, if abrasion and corrosion and loose fish-plates more often exist on the road than perhaps many believe, there must be some substance to resist destruction. With a fishing angle of only  $11^\circ$ , as in the Belgian Goliath section, there is only one millimetre on the rail head to wear off before the fish-plate touches against the web. This is the reason why I have lately adopted  $15^\circ$ , as I then get 3 millimetres wear.

But, as in old sections, the execution of rolling to a nicety of a millimetre under the rail head is more or less difficult to obtain, the result is that there are more fish plates touching the web on our railways than is generally supposed.

In the discussion on Holley's paper in 1881, on this subject, I showed the wear of a web of a rail taken from one of

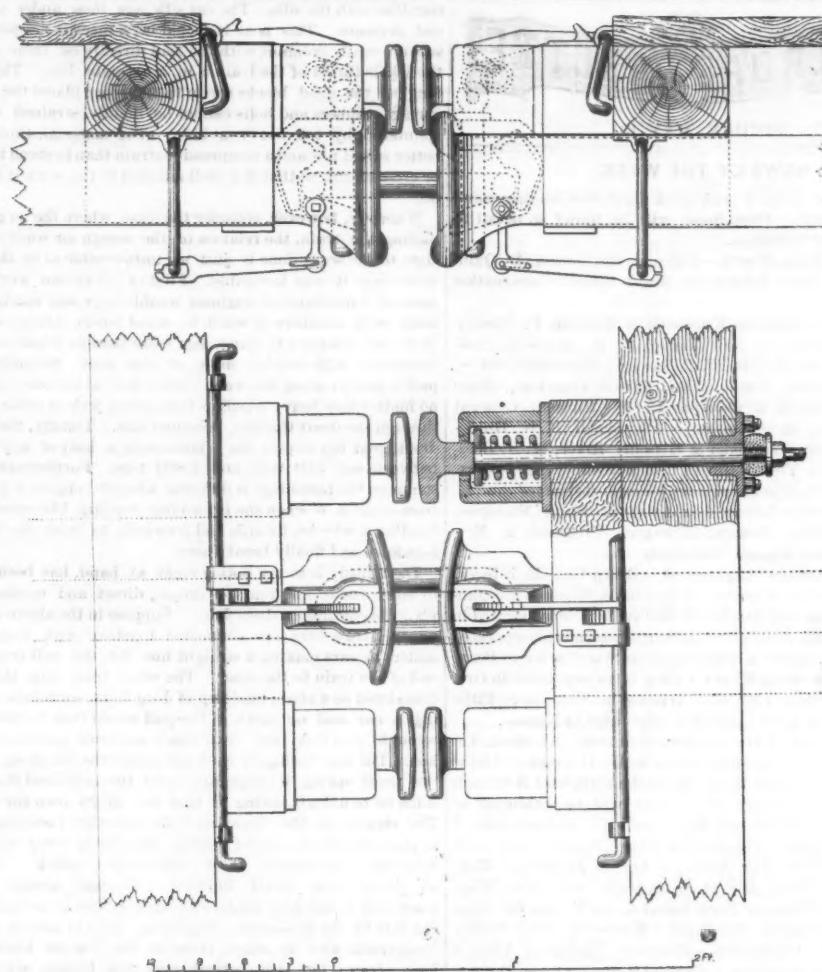


Midland Great Western of Ireland Rail Section—1863.

the principal German roads, but it was not my section, nor had I had anything to do with it. It was taken as a demonstration that  $\frac{1}{2}$ -in. web is needed to provide against corrosion. I also showed a drawing of an American rail after eight and half years in a tunnel; both drawings inclosed herewith. [The drawings are not reproduced here. The German rail shows, after eight years service, a loss of nearly 50 per cent. of its thickness from corrosion, and the wear of the fish plates; and the American rail lost nearly 30 per cent. from corrosion alone.]

Now, as to "the good idea and scientific disposition of the metal," as you call it, in making it thicker down toward the base in proportion to the increased leverage of forces, I beg to inclose a drawing of such a section executed at Rhymney works, five and twenty years ago for an Irish railway. I am not aware of it having been adopted anywhere else in Europe, but perhaps this Irish invention might be more fortunate for adoption in America.

Finally, as to the hardness and the heavier weight of the rail, I am entirely of your opinion, and have boldly advanced



THE MCKEEN FREIGHT CAR COUPLER AND BUFFER.

my theories, *heavy* and *hard* rails, *light* and *soft*, to avoid breakages and accidents. The latter will flatten and require to be more frequently changed, but, if made hard, they would be liable to break. To avoid crushing or flattening, rail steel should contain, say, at least  $\frac{1}{10}$  per cent. of carbon, or more. This could be given with perfect safety in the heavy sections, but not in the light ones, on account of the risk of breaking.

I know I am laying myself open to the charge by railway engineers that it suits the inspector, as well as the maker, to argue in that way, as they are both paid by the ton. To this I have to say that rails, nowadays, even admitting that they are made softer than ten years ago, and that they flatten more and require more frequent exchange, still they are safer, more regular in quality, and do not cause accidents, when not overloaded; and on this side they are only one-third or one-fourth of the price that they were then. The item, therefore, of the cost of rails on the railway never was less than at the present time, which is all the more reason to make the safety of the traveling public the first consideration. Therefore a *heavier* rail and a *hard* rail should be adopted by those who can afford it, and the *softness* and *flattening* of the *light* rail be tolerated by others who can not stand the increased outlay for the *heavier* rail.

Regarding the Belgian Goliath, I should say it weighs 105 lbs. per yard, while mine weighs exactly, to calculation, 100 lbs. Thus the Belgian engineers have improved on my section 5 per cent., although, when I proposed the 100 lbs. a year ago, they found it a great deal too much.

The execution of the rolling which I attended was the greatest treat, owing to the excellent results it gave. The same mill that rolls 90-lb. rails, with 3 or 4 per cent. waste, rolled this 105-lb. rail with 1 per cent. waste, and no extra hands nor breakage of machinery of any kind; so that certainly the fact is established, from the makers' point of view, that the heavier the rail the cheaper the make.

Half a ton each rail was a magnitude that astonished everybody, even the oldest inspector, and I am happy to say that negotiations are already opened for the adoption of this rail in other countries of Europe.

Being thus deeply impressed with the importance of the introduction of the heavy rails to the whole railway world, I have taken a stand at the American Exhibition in London, and invited railmakers from all countries, America first, of course, to forward short pieces of the heaviest rail sections they have executed to this cosmopolitan stand, so to speak, and the Goliath will figure foremost.

By this I am laying myself open to criticism, but I have no patent or private interest, and only wish to be corrected in case of being in error, and I hope thus to arrive at the truth.

C. P. SANDBERG.

#### Buffers on Freight Cars.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The accompanying drawings show a plan and elevation of the freight car buffers referred to in a recent communication, together with the new method of applying the rods for our coupler.

It will be observed that half an inch free slack is left when the buffers are extended.

It is designed to use a graduated spring that will compress easily for the first half or three-quarters of an inch, after which the resistance will be continuously greater until the action of the spring is taken up.

The draw-bar will extend one-half to three-quarters of an inch beyond the face of the buffer when the latter is compressed, thus allowing the draw-bar spring to bear a portion of any severe shock. By this means three springs on each end of a car would absorb the blows of concussion instead of one as at present. This would remedy the defect shown in the tests on the Chicago, Burlington & Quincy a week ago, where even with hook couplers having strong springs, very heavy shocks to loaded cars were experienced.

Another reason for having the buffers compress within the natural projection of the draw-bar is to enable coupling and uncoupling on curves to be readily accomplished.

It is evident that by the use of these buffers the number of broken draw-bars will be very considerably diminished, while the wear and tear upon cars, and the effect upon live stock and other kinds of freight caused by train shocks will in a large measure be overcome.

Regarding the application of the rods for handling the pin and controlling the link, as shown in the drawings, we can say that it costs no more for the two rods than for the one used formerly with our couplers, as, where two rods are used, they are of lighter material, and are also shorter, their combined weight being no more than the one rod previously employed. In the method shown there are no split rings, bolts or nuts, no handles outside of the car, and no obstruction by snow or ice can occur. It can be applied to all kinds and patterns of cars and to the tenders of locomotives, at no greater cost than the single rod.

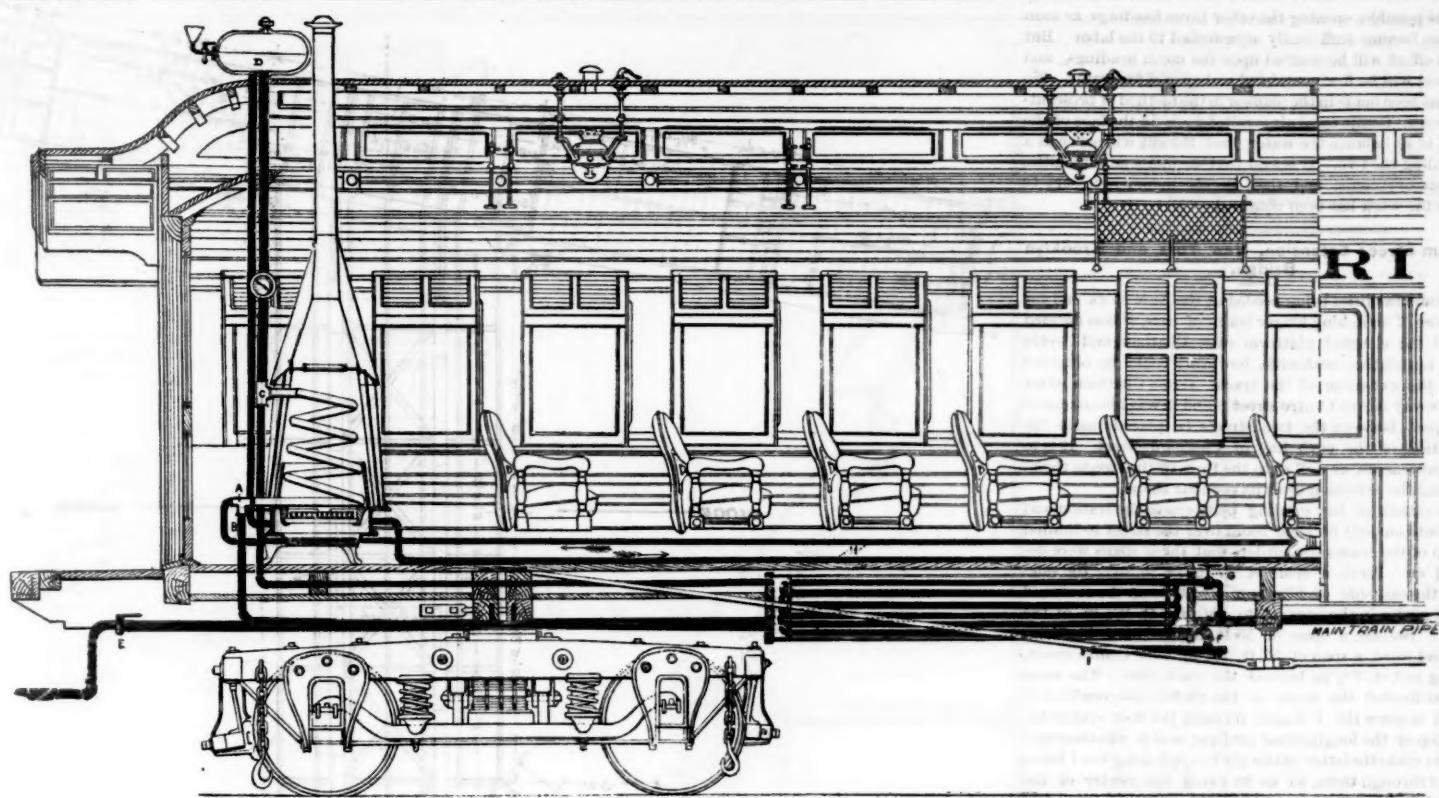
MCKEEN CAR COUPLER CO.

#### Heating System of the Safety Car Heating and Lighting Co.

In the appliances of this company the aim has been to use, so far as practicable, the plant now in service, to provide independent heating in emergencies and to secure uniformity of method for convenience of interchange.

The heating apparatus, shown in the illustration, is the invention of Mr. F. M. Wilder, formerly Superintendent of Motive Power of the New York, Lake Erie & Western, who is the General Manager of the company organized to manufacture it.

In this system live steam is taken from the locomotive and carried back underneath the train. Flexible steam-tight couplers are used which uncouple automatically in case of the train parting, or when cars are cut off. Underneath each car is a drum, in which is placed a bench radiator, through which the steam is forced. The cold water pipe of the Baker, or other water-circulating heater is tapped (A) near the furnace, and the pipe is brought down through pipe B, and connected with the bottom of the drum; the hot water pipe of the system is tapped at a point C, where it leaves the furnace, and brought down to the top of the drum, which is placed horizontally under the



CAR HEATING SYSTEM—SAFETY CAR HEATING AND LIGHTING CO

cars just back of the trucks, and as near to the truck as possible. The drum is also placed, when possible, up between the sills, on the same side as the heater. By these connections the drum becomes a part of the regular circulating system of the car, the water in the drum being around the steam pipes of the coil or radiator. The condensed steam is carried off by a trap. There are no cocks between the heater and the drum, the only valve necessary being to control the supply of steam to the coil in the drum, so that if at any time the steam supply fails, it is only necessary to start the fire in the heater to keep up the circulation. The expansion reservoir D is as now used with the Baker heater. E is a three-way cock for blanking the pipe at the end of a train; F is the trap to carry off water of condensation from the coil; G is the branch pipe from the train pipe to the radiating coil, provided with a cock for controlling the supply of steam to the drum, and H is the circulating pipes.

The device used with the hot-air circulating systems known as the Gouge, Spear, Creamer or other, is to attach a pipe to the air-pipe where it leaves the furnace, bringing it down through the floor, and carrying it along back to a point between the trucks. The air is controlled by a valve in the pipe, which changes the current of air to either pipe at will. The new pipe is connected to a box containing a bench radiator of sufficient size to take the place of the steam in furnishing the requisite heat. The air is then forced up in the regular pipe and is distributed through the car in the usual manner. The steam is controlled, as in the water-circulating system, by a valve which is worked from the inside of the car. A trough is provided, into which condensed water runs and the current of air is projected down into this water, and is thus cleansed from the dust, cinders and smoke.

A train equipped with the hot water system is now running on the 3 p. m. express over the New York, New Haven & Hartford and New York & New England to Boston. The trial train showed that the system was perfect in every particular, the heating being under control from the inside of the car at the will of the porter or other person in charge, and it was found that any inconvenience of the ordinary circulation system was avoided, as whenever heat from the furnace is used, where the circulation is established, it is found difficult to reduce the temperature if the car becomes too hot; but with this device it is simply necessary to check the supply of steam to regulate the heat at will. About one minute after steam was turned on it had traveled to the back end of five cars. In about three minutes after the steam had passed through the train, circulation commenced in the pipes in each car, and in 25 minutes circulation had been established throughout the whole train. The train ran through to Boston with very little steam used on account of the warm weather, but the heat was fully and easily controlled by use of the steam cocks in the cars, and the cars were kept comfortable, so that there were no criticisms by passengers or others in regard to the heat.

The address of the company is 160 Broadway, New York.

#### A Coupler Combination.

The agreement by which a decisive forward step in the solution of the coupler problem is to be taken has now been assented to by a sufficient number of companies to give exceptional interest to their action, which is shortly to result in a series of tests in the vicinity of New York City.

The roads which have already signed the agreement operate more than one fifth of the mileage of the country, and several other lines are considering the matter with a view to join in the movement. The preliminary circular which

served as a starting point, sent to the railroads by Mr. Edward Vernon, Secretary of the Committee, 36 Wall street, New York, after reciting the facts of the present situation, goes on to say:

"It is therefore proposed that the leading railroad companies unite in appointing a commission of experts who shall make a careful and thorough test of the various couplers submitted for use, and that upon the recommendation of the majority of such experts, the companies uniting in their appointment shall agree to use upon all cars upon which they place the automatic coupling devices the particular form of device, or combination of devices, which may be recommended by a majority of said experts. This will doubtless enable such a combination to be made of the several patents covering useful devices in this connection as will avoid the litigation that must ensue if they are not combined, and will enable the railroad companies to have a device that shall be as near perfection as the present state of the art will permit."

The circular gives statistics as follows:

The statistics of employés killed and injured on the railroads of the United States show a fearful account against the link and pin couplers. The following are the figures for the state of New York, according to the reports of the Railroad Commissioners:

Employés killed and injured in coupling or switching cars.		
In 1883	Killed.	Injured.
.....	34	330
" 1884	17	386
Total for two years.....		
	51	716
Total number of employés killed and injured in New York state:		
In 1883	Killed.	Injured.
.....	175	722
In 1884	147	799
Total for two years.....	322	1,521

These figures show that, of the total number of employés killed and injured in the two years, those owing their injuries to coupling or uncoupling cars were, of the number killed, 16 per cent, and of the number injured 47 per cent.

The freight train mileage of the railroads of the state of New York in 1884 was 31,975,136, and of the railroads of the whole country 334,814,529. If we assume the ratio of the accidents from coupling and uncoupling to be in proportion to the freight train mileage, it would indicate a total for the United States of at least ten times the number reported for the state of New York, or say, per annum, killed 255, and injured 8,580.

The agreement between the roads binds them to abide by the decision of the board of experts, and specifies a maximum price which will be paid for the coupler itself and for royalty (per car). Each road appoints its own expert on the board, and the list, so far as made up, is as follows, most of the gentlemen representing several roads each:

W. P. Shinn, Vice-President and General Manager of the New York & New England; O. A. Haynes, Inspector of Locomotives and Cars, Missouri Pacific; T. L. Chapman, Superintendent Motive Power, Newport News & Mississippi Valley; A. G. Darwin, President Strong Locomotive Co.; James Meehan, Superintendent Motive Power, Cincinnati, New Orleans & Texas Pacific; T. W. Small, Superintendent Motive Power, Northern Pacific; Reuben Wells, of the Rogers Locomotive and Machine Works, late Superintendent Machinery, Louisville & Nashville; F. M. Wilder, late of the New York, Lake Erie & Western.

The tests will follow substantially the well-known plan laid down by the Master Car Builders' Association, as will be seen by the circular to the coupler companies, which is as follows:

The committee of experts, appointed by railroad companies representing more than thirty thousand miles of railroad in the United States, to examine thoroughly into the merits of the automatic draw-bars and couplers recommended for further trial by the Executive Committee of the Master Car-Builders' Association, or such other couplers as

may be recommended by five representatives of the same association, with the view of selecting one for uniform adoption, desires to inform you that arrangements are now being perfected for such thorough test and examination. The preliminary tests will be made on tracks laid under the direction of the committee, in which provision will be made for all conditions of practical service, to which any coupling device can possibly be subjected.

This is sent you by mail of even date herewith a blue print of the car and tracks, which it is proposed to use in the trial, and which the committee recommends that you follow closely in arranging the various parts of your device should you desire to compete. The two cars which you are required to send for trial must be equipped with your draw-bar and coupler of full size and in full working order, and it is specially recommended that, in order to ascertain the variation of heights at which your coupler will work satisfactorily, one of the cars should be equipped with a draw-bar at each end, one of which should be set at the maximum of height under which you claim that your draw-bar and coupler will work efficiently. It is also suggested that you furnish at least six specimens of your coupler (which will be subjected to physical tests by the committee) together with details of the material used in its construction, and the special adaptation of such material from your personal experience, to satisfy the requirements of economy and efficiency.

The committee should be also informed on what railroads (if any) your draw-bar and coupler are in actual service, and the number in use; and if not in actual service by what railroads (if any) experimental tests have been made of the same and with what results.

All arguments in favor of any particular device must be presented in writing, as far as practicable. It is desirable that the test-cars and couplers should be ready for the experimental trials by May 25.

Any further information which you may desire will be readily furnished by the committee, and shipping instructions will be forwarded you as soon as the committee is notified by you that your couplers are ready for trial.

The 12 couplers recommended for trial by the Master Car Builders' Association Executive Committee are the Ames, Archer, Cowell, Dowling Gifford, Hien, Janney, Marks, McKeen, Perry, Thurmond and Titus & Bossinger. These together with the Barnes and the Browning, recommended by five members of the present committee, have been invited, making 14 couplers which have been invited to appear at the test; and several of them have already signified their intention of competing.

#### The Hudson River Tunnel.

In the fall of 1882 all operations connected with the Hudson River Tunnel were suspended because of lack of funds. At that time the north tunnel had advanced 1,600 ft. from the shaft at the western end, and 175 ft. from the caisson at the eastern or New York end, while the headings of the south tunnel were 600 ft. and 30 ft. from western and eastern shores, respectively. When it was decided to stop work the headings were closed by timber bulkheads and the air compressors stopped, when the water slowly found its way in, as the air escaped, and filled the tunnels and shaft.

Six weeks ago, after having been flooded for three and a half years, the water was pumped out of the tunnel, the air forced in beyond the two air locks in the western section of the north tunnel, and the work of building actively resumed day and night. When erecting the temporary bulkhead no attempt was made to make it water-tight, and through the cracks the silt had found an easy passage, and completely filled the end and extended into the tunnel about 100 ft. This has all been removed, two sections of 10 ft. each have been lined with plates in the old way, and the section joining the completed masonry has been about two-thirds bricked.

A recent examination of the work shows that the masonry was in no way injured by its long immersion, no cracks, which would result if unequal settling or shifting took place being apparent. It is expected to push the work forward as

rapidly as possible, opening the other three headings as soon as the men become sufficiently accustomed to the labor. But the main effort will be centred upon the north headings, and that tunnel will be first completed and opened for traffic. No change has been made in the plans or in the method of prosecuting the work. Compressed air is relied upon (in the face of the heading) to so balance the water that the silt will serve as a wall dividing the two. It is said that the financial difficulties have been overcome, and that all the money necessary to complete the work has been obtained.

**Chatham Street Extension, New York and Brooklyn Bridge.**

Additional facilities being needed at the New York end for the purpose of switching longer trains of cars, it was decided to extend the elevated platform over Chatham and Centre streets. Legislative authority, however, could be obtained only for the extension of the tracks across Chatham street and a footway across Centre street; and it was also required that the posts between the two streets be placed inside the prolongation of the curb line of Chatham street. It is to these requirements, as well as to the form of the streets themselves, that the extension owes its peculiar shape.

The elevation of the existing platform in the station and the requisite amount of head room over the street so limited the depth of the transverse girders that three spans were determined on. First, a span of 27 ft. 4 $\frac{1}{4}$  in. over the sidewalk on the east side of Chatham street, from the centre of the front girder in the station to within 1 ft. 9 $\frac{3}{4}$  in. of the curb line. Second, a span of 55 ft. 6 $\frac{1}{4}$  in. over Chatham street; and third, a span of 57 ft. 7 $\frac{3}{4}$  in. over Centre street, extending to 1 ft. 7 $\frac{1}{2}$  in. beyond the curb line. The same cause that limited the depth of the girders also rendered it necessary to place the I beams forming the floor system below the top of the longitudinal girders; and it was therefore decided to make the latter lattice girders, allowing the I beam to project through them, so as to bring the centre of the footway directly over the centre of the outside girder. For the sake of uniformity the transverse girders were also made latticed.

That portion of the extension over Chatham street consists of three lattice girders on each side of the centre line spaced 3 ft. 10 in., 4 ft. 10 in., and 7 ft. 4 in., with a further projection of 4 ft. 6 in. of the I beams, on the outside ends of which is fastened a plate girder, making the total width of 40 ft. between plate girders. For the footway over Centre street, there are two lattice girders spaced 3 ft. 10 in. on each side of the centre line, and two plate girders 4 ft. 2 in. from the other girders, making the width 16 ft. between plate girders.

The transverse and longitudinal girders are made of steel throughout, and are fastened together with steel plates and rivets. The I beams and plate girders are of iron.

The rolling load was taken as that of an ordinary unloaded steam railroad passenger train on each track, and a live load on footways of 100 lbs. per square foot.

The safe strengths taken were for steel 13,000 lbs. per square inch, net section for tension, and gross section for compression; and for wrought iron 10,000 lbs. per square inch. The safe strength of rivets per square inch of section of steel was taken at 9,750 lbs. single shear, with a bearing value of 19,500 lbs., and of wrought iron 7,500 lbs. single shear and 15,000 lbs. bearing value. Generally  $\frac{3}{4}$ -in. rivets were used, spaced  $2\frac{1}{2}$  in., or its multiples, apart, with lines staggered.

For certain special reasons, not of a professional character, Phoenix columns, 14 ft. 9 in. long, were used, and on them the transverse girders were placed. These girders were made 48 $\frac{1}{4}$  in. out to out of angles, 19 ft. 8 $\frac{3}{4}$  in. centre to centre of columns, and 36 ft. 10 in. long. The top and bottom chords were of 6 in.  $\times$  4 in.  $\times$   $\frac{1}{16}$  in. angles, spaced  $\frac{1}{8}$  in. apart, with  $\frac{1}{16}$  in. cover plates. The ties were of  $\frac{3}{8}$ -in. plates, going between the vertical legs of the angles, while the struts, which were of channels, were outside the angles, so that at the panel points the rivets were driven through all three members, namely, the strut channels, the chord angles and the plate-ties. As far as possible, this style of joint was used in all the lattice girders.

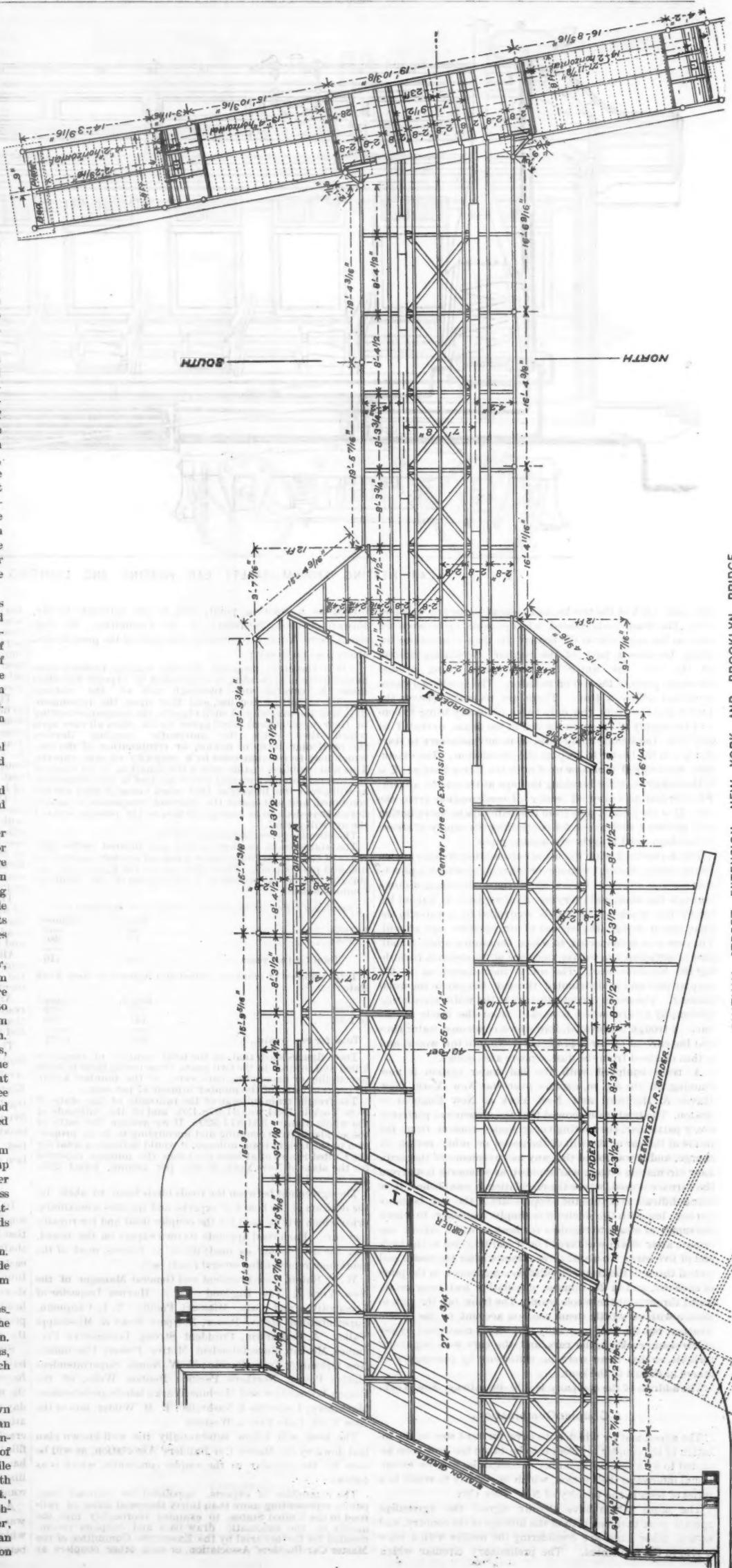
The longitudinal girders over the roadways of Chatham and Centre streets were 47 $\frac{1}{2}$  in. deep, with chords made up of 6 in.  $\times$  4 in.  $\times$   $\frac{1}{16}$  in. angles, placed  $\frac{1}{8}$  in. apart, with cover plates top and bottom, and with ties of the same thickness as the distance between the chord angles. Over the Chatham street sidewalk the girders were 40 in. deep, with chords of 5 in.  $\times$  3 in.  $\times$   $\frac{1}{8}$  in., angles placed  $\frac{1}{8}$  in. apart.

The outside plate girders were made up of a 20 in.  $\times$   $\frac{1}{4}$  in. web, with top angles of 3 in.  $\times$   $2\frac{1}{4}$  in.  $\times$   $\frac{1}{16}$  in. on the outside and  $2\frac{1}{2}$  in.  $\times$   $2\frac{1}{2}$  in.  $\times$   $\frac{1}{16}$  in. on the inside, and two bottom angles 3 in.  $\times$   $2\frac{1}{2}$  in.  $\times$   $\frac{1}{16}$  in.

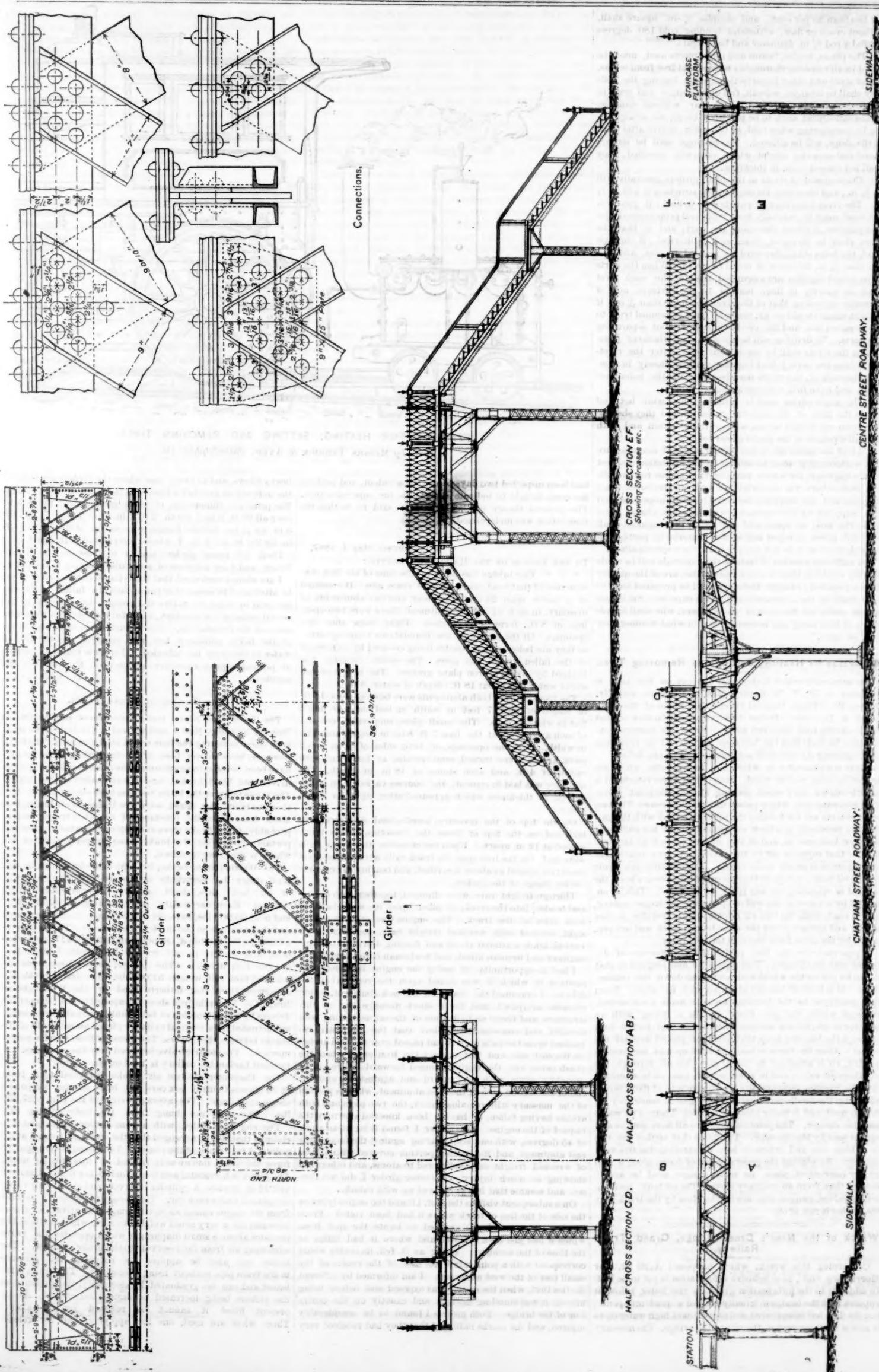
The floor system consisted of 8 in. I beams, running transversely through the longitudinal girders close under the vertical leg of the top chord angles, and fastened by two 4 in.  $\times$   $\frac{1}{16}$  in. plates, riveted to the lattices. On these 8 in. I beams, were fastened 6 in. beams running longitudinally, on which the planking was laid.

The following are some of the specifications:

"The steel shall be of a suitable and uniform quality known as mild steel, and incapable of tempering; it shall have an elastic limit not less than 35,000 pounds and an ultimate tensile strength not less than 65,000 pounds per square inch of section; in the several parts, except rivets, under tensile strain, it shall stretch not less than 20 per cent. in 8 in., with a reduction of the fractured section not less than 25 per cent., and samples  $\frac{3}{4}$  in. square shall, without crack or flaw, withstand bending cold 180 degrees around a rod  $\frac{3}{4}$  in. diameter, and in rivets, under tensile strain, it shall stretch not less than 25 per cent. in 8 in., with a reduction of the fractured section



CHATHAM STREET EXTENSION, NEW YORK AND BROOKLYN BRIDGE.



CHATHAM STREET EXTENSION, NEW YORK AND BROOKLYN BRIDGE.

ELEVATION.

CENTRE STREET ROADWAY.

CHATHAM STREET ROADWAY.

not less than 35 per cent., and samples  $\frac{1}{4}$  in. square shall, without crack or flaw, withstand bending cold 180 degrees around a rod  $\frac{1}{8}$  in. diameter and back again.

" The plates, angles, beams and other pieces used, must be sound in all respects, thoroughly welded and free from seams, cinder spots and other imperfections; upon leaving the rolls they shall be straight, smooth, full on the edges and true to dimensions, and in a fit condition to bear, without damage, all the subsequent work to be put upon them; no straightening by hammering when cold, at the rolling mill or afterward at the shops, will be allowed. The castings shall be strong, sound and smooth; except where otherwise specified, they shall not exceed  $\frac{1}{4}$  in. in thickness.

" The diameter of rivets in the plate girders generally will be  $\frac{5}{8}$  in., and elsewhere throughout the structure it will be  $\frac{3}{4}$  in. The rivet holes may be punched or drilled; if punched, the work must be carefully done with well-proportioned dies and punches, without distorting the part, and so that the holes shall be straight, clean and cylindrical; if through steel, the holes shall afterward be reamed to size, and not less than  $\frac{1}{8}$  in. thickness of metal removed. When the parts to be joined together are assembled, the holes for each rivet shall be strictly in line, normal to the surfaces, and of diameter exceeding that of the rivet not more than  $\frac{1}{16}$  in.; if a slight misfit should occur, the holes must be reamed truly to the required size, and the rivets driven without separating the parts. No drifting will be allowed, and wherever practicable the rivets shall be machine-driven. After the riveting is done the parts joined together shall be closely in contact throughout, the rivets shall be tight, fill the holes perfectly and have full, concentric heads.

" The angle-plates shall be bent to shape while hot, and across the fibre of the material; when finished they shall be free from cracks and seams, without initial strain and with the full strength of the plates preserved.

" All of the materials in any or all stages of manufacture and workmanship shall be subject to full inspection and test by the engineer; for which purpose free access to the mills and shops where the materials are made and wrought shall be given and the requisite facilities for such inspection and tests supplied by the contractor without extra charge; and up to the final acceptance of the work, the engineer shall have full power to reject any of the material or parts, if in his judgment such do not comply with these specifications.

" A sufficient number of tests of the materials will be made to fully establish that in every respect they are of the quality herein required; samples therefore shall be prepared and the tests made by the contractor and at his expense. Such tests will be under the direction of the engineer, who shall be sole judge of how many are necessary, and in what manner they shall be made."

#### Apparatus for Heating, Setting and Removing Tires.

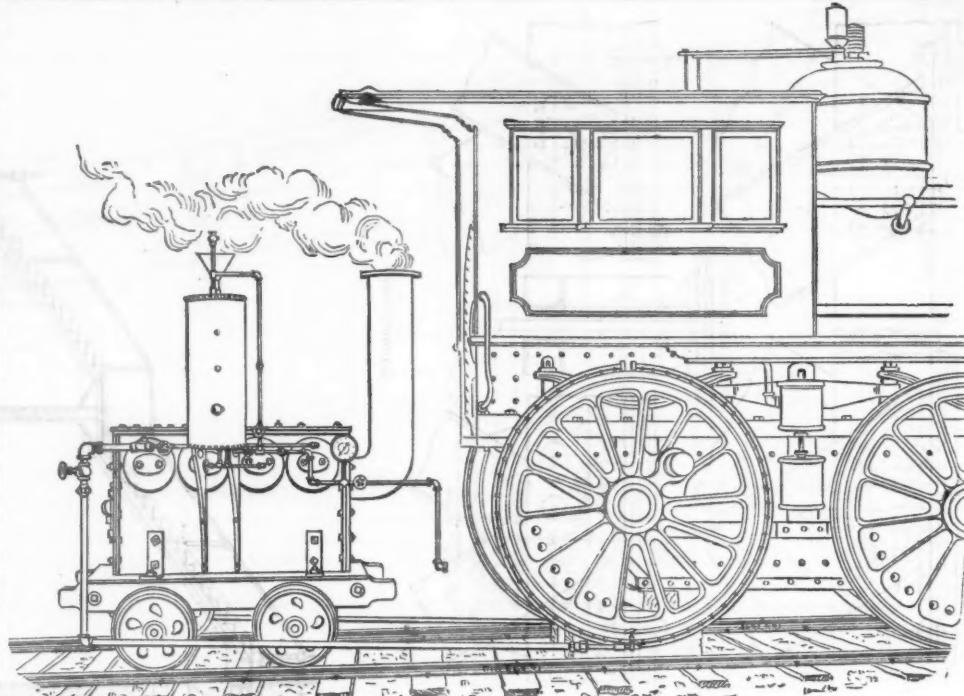
The apparatus which is shown in the cut on this page is patented by Mr. T. W. Gentry, Master Mechanic, and Mr. George W. O'Brien, General Foreman of Shops of the Richmond & Danville. It has been very satisfactory on that road—saving fuel, time and labor. From Mr. Gentry's experience he finds that the kerosene oil burned in removing and replacing six tires will not cost more than one dollar.

There is a generator in which are four retorts, which are heated by coke, coal or wood. Into one of these retorts oil is fed through a very small opening and needle-point valve. This generates gas, which passes into another retort. The two other retorts are for heating the air that is used with the gas. In close proximity is a tank containing about ten gallons of common kerosene oil, and at any desired place is an air compressor that supplies air to the device. A very convenient arrangement is an air brake pump. Attachments are made to this oil tank, on top, so that an equal air pressure is on the oil that is operating on any part of the plant. This is controlled by a valve at the will of operator. A larger connection is made with the two air retorts in the generator, so that the air and gas are about the same temperature and are propelled by the same force through the generator.

A pipe encircles the tire, perforated at intervals of  $2\frac{1}{2}$  inches with small holes. This pipe is cut and plugged so that it can be put on the wheel without taking down the connections. It is held off the tire about an inch by studs. From the generator to the burning hoop is made a connection, through which the gas flows, and in a fitting with an injector nozzle the air mingles with the gas and forces both through the burning hoop that has been placed around the wheel. After the furnace has been fired up and the rotorts are hot, air is admitted to them; also, the oil through the needle-point valve, and in a few seconds gas can be admitted into the burning hoop and fired. The amount of flame is regulated by the needle-point valve. The gas is made only as fast as used, and is under absolute control. There is no waste and no danger. The points of pressure all have gauges and can be seen by the operator. The flame that strikes the tire is a blue one and intensely hot, penetrating the tire very quickly. By placing the generator out of doors, along a wall or any convenient place, no more danger need be apprehended than from an ordinary stove. The oil tank, manipulating valves, gauges, etc., are inside, close by the track that the engine is run in on.

#### Wreck of the Nash's Creek Bridge, Grand Trunk Railway.

Concerning this wreck, which happened April 22, near Morrisburg, Ont., no conclusive information is yet to be had. In addition to the information given in the letter below it appears that the bridge originally crossed a quiet mill-pond; but the dam has disappeared, and at periods of high water there is now a swift current at the site of the bridge. The masonry



APPARATUS FOR HEATING, SETTING AND REMOVING TIRES

Made by MESSRS. PEDRICK & AYER, Philadelphia, Pa.

had been inspected two days before the accident, and nothing has come to light to indicate defects in the superstructure. The general theory in the locality is said to be that the foundation was undermined.

MORRISBURG, May 4, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

\* \* \* This bridge was built at the time of the first construction of that road, more than 30 years ago. It consisted of a centre span 24 ft. in the clear, and two abutments of masonry, in each of which abutments there were two openings of 8 ft., formed by arches. There were thus five openings. Of the nature of the foundations I can say little, as they are below water, besides being covered by stonework of the fallen arches and piers. The centre opening was bridged by wrought-iron plate girders. The height of rail above water was about 18 ft.; depth of water, 3 ft.

The front walls of both abutments were built as piers, 18 ft. in length of face, 7 feet in width in body of pier, and 5 feet in width at ends. The small piers, supporting one end of each arch, were at the base 7 ft. 8 in. in length, and 4 ft. in width. Over the openings, on both sides of these small piers, arches were turned, semi-circular in form, and with radius of 4 ft. and arch stones of 18 in. in depth. The masonry was laid in cement; the courses varied from 13 in. to 8 in. in thickness, which appears rather light for durability.

On the top of the masonry, longitudinal stringers were laid, and, on the top of these, the cross-ties, 7 in.  $\times$  9 in., spaced at 12 in. apart. Upon the cross-ties the track rails were laid. On the iron span the track rails were placed upon cross-ties, spaced as above described, and bearing direct upon the top flange of the girders.

Thirteen freight cars were dumped, together with engine and tender, into the creek, or piled upon its west bank on both sides of the track. The engine was entirely out of sight, covered with wrecked freight cars; merchandise of various kinds scattered about and floating down the stream; engineer and fireman killed, and brakeman badly injured.

I had no opportunity of seeing the engine in exactly the position in which it was found upon the removal of the debris. I examined the track on the east abutment, which remains uninjured, and for a short distance east of this structure, and found no indication of the engine having been derailed, and, consequently, believe that the locomotive remained upon the rails until it had passed over the two arches on the east side, and had crossed the iron span, when the crash came, and the engine plunged forward and fell in an upright position, with its forward end against the extreme end of the second arch of the west abutment, where a portion of the masonry still remains intact, the two piers and both arches having fallen, or having been knocked down by the impact of the engine. One girder I found lying at an angle of 45 degrees, with one end bearing against the face of the east abutment, and its greater portion covered with a mass of wrecked freight cars, splintered to atoms, and others not showing so much injury. The other girder I did not then see, and assume that it was covered up with rubbish.

On a subsequent visit to the spot, I found the engine lying on the side of the line of track where it had been rolled. From its present position I was enabled to locate the spot from which it had just been removed and where it had fallen at the time of the accident. Lying as it fell, its centre would correspond with a point a few feet east of the centre of the small pier of the west abutment. I am informed by different parties that, when the engine was exposed and before being moved, it was standing upright and exactly on the centre line of the bridge. Both girders I found to be considerably injured, and the marks indicated that they had received very

heavy blows, and in every case where the girders are injured the indications are that a blow was the cause of the damage. The principal dimensions of these girders are: the length over all 28 ft. 3 in.; depth, 2 ft. 8 in.; top flange,  $7\frac{1}{2}$  in. by 5 in. by  $\frac{1}{8}$  in.; bottom flange, same as top; stiffening bars, 6 in. by  $3\frac{1}{2}$  in. by  $\frac{3}{8}$  in. T, placed intervals of 5 ft. apart.

There are many girders similar to these on the Grand Trunk, and I am unaware of any failure having taken place.

I am almost convinced that the collapse of this bridge must be attributed to some other cause than the failure of the girder, and in order to arrive at a positive conclusion as to the actual cause of the accident, a careful examination should be made of the foundations. This is impossible until the débris of the fallen abutment has been removed and the flow of water in the creek has subsided. For these reasons I cannot at present express a positive opinion upon the cause of the accident.

H. H. KILLALY.

#### The Burlington Brake Trials.

The Burlington brake trials commenced punctually on Monday morning, May 9, and several hours daily have since been spent in testing the four trains on the ground. The tests, however, have not yet been of an important character and have been devoted to ascertaining the relative efficiency of the driver and hand brakes, and the resistance of the trains. The importance of the latter test has been shown by the fact that one train, that fitted with the Hanscom air brake, had about four times the resistance of the other trains, owing, probably, to the brake shoes rubbing on the wheels. The importance of having the brake shoes properly clear of the wheels is thus clearly shown.

The Westinghouse brake, by which the brake can be applied either by electricity or air, is fitted to a train of 50 box cars, built at the Pennsylvania shops, Altoona. Each car weighs on the average 30,577 lbs., and is of 60,000 lbs. capacity. Iron brake beams are used and the shoes are on the inside of the wheels. The engine is a Chicago, Burlington & Quincy standard, with 17-inch cylinders, and weighs in all 81,450 lbs., with 54,000 lbs. on the four driver. The tender, with four tons of coal and tank full, weighs 57,000 lbs. The driver brake is a departure from that hitherto used by the Westinghouse Brake Co. Wrought-iron shoes are applied to both sides of the drivers by a combination of bell crank levers and lever hangars actuated by a vertical cylinder placed on each side of the engine between the drivers. The piston of this cylinder moves upward. The electric valve is placed near the couplings. A two-cell Leclanché battery is used on the engine.

The Carpenter electric air brake is applied to a train of 50 Illinois Central box cars just built at the company's shops at Chicago. The average weight of the cars is 27,850 lbs. The shoes are hung from the body of the car.

The engine is fitted with a cam driver brake, and it is claimed that it is so arranged that the leverage is equal at all points of the stroke of the piston. The piston is arranged to force the cams downwards instead of upwards as usual. The pump is horizontal and the cylinders are 6 in. diameter and 12 in. stroke. A cylinder reservoir and electric air valve are placed under each car. The passage of an electric current from the engine causes an electro-magnet to attract an armature and lift a very small weighted valve, which reduces the pressure above a small diaphragm which operates the valve admitting air from the reservoir to the brake cylinder. The brake can also be applied by reducing the pressure in the train pipe without using electricity. The brake is released and can be graduated by electricity, the pressure on the pistons being increased or diminished at will. As at present fitted it cannot be released by air alone. Three wires are used, one for applying, one for releasing,

ing and one for the return current. The coupling will connect with the Westinghouse as regards air. A four-way cock is placed under each car so that the brake can be cut out or worked straight air if desired.

The Eames brake cars have not yet been weighed, but are Chicago, Burlington & Quincy standard. An electro-magnet placed in combination with levers and valves controls their well-known equivalent of a triple valve. The engineman can graduate the brake by electricity, gradually reducing the pressure with which it is applied. A peculiar arrangement of lever is employed under the car, by which the leverage is increased as the stroke progresses. The leverage is also increased when the car is loaded. The driver brake consists of a bell crank lever, pulling on a toggle joint. Two wrought-iron shoes are applied to each driver.

The Hansom air brake is applied to St. Joseph and St. Louis cars, weighing on an average 24,807 lbs. No driver brake is used.

The train fitted with the American buffer and electric air brake is not yet ready, and is not expected to arrive at Burlington for several days.

The Card electric brake train is on its way to Burlington, but has not yet arrived.

The trials are not yet sufficiently advanced to enable any useful figures to be given as to the distance in which the trains can be stopped. Only two stops, and those not in the regular series of tests, have been made with the continuous brake applied to the whole train of 50 cars. In one case the Westinghouse train was stopped by air, no electricity being used, in 492 ft. when running down a 58 ft. grade at 32 miles per hour. The shock in the rear car was considerable, the slideometer moving 46 inches. The limit permissible in service is certainly under 12 inches. A very similar stop was made by the Eames brake, by electricity, without any shock in the rear car.

A considerable number of visitors from various railroads have already arrived, and more are expected towards the end of this week and the beginning of next, when the most interesting portion of the trials commences. Among those present may be mentioned, L. Clark, T. Campbell, J. M. Lowry, J. N. Barr and Geo. Gibbs, Chicago, Milwaukee & St. Paul; R. H. Wilbur, J. Lentz, Bowman and Holliday, Lehigh Valley; W. Nettleton, Jr., Kansas City, Fort Scott & Gulf; E. P. Lord, Pennsylvania; R. W. Berry, J. Bailey and S. P. Bush, Panhandle; Benjamin Welch, Southern Pacific; John Lange, Wabash Western. Mr. L. S. Coflin, Railroad Commissioner, state of Iowa, is also present.

#### English Railways—Their Administration, and the Status and Duties of Executive Officers.

Since the early days of the old Stockton & Darlington, and Manchester & Liverpool railways, the English railway service has been the cradle of a race of administrators, whose achievements are recorded in every country on the globe. Canada, India, Australia, South America, South Africa, Sweden, Turkey, Egypt, Portugal, are some of the countries that have their railways financed and officered by men bred in English offices and workshops. Large numbers of foreign railways have their headquarters in London. The capital has been mainly subscribed by British investors and the directorates are consequently largely English. Naturally they turn to the home lines to find suitable men to take charge of railway enterprises abroad, not only in constructing and equipping lines of road, but in running them.

The Grand Trunk Railway of Canada is a case in point. It was constructed with British capital, raised by the London banking houses of Baring Brothers and Glynn, Mills & Co. Mr. Hickson, the General Manager, went from the Manchester, Sheffield & Lincolnshire Railway. Mr. W. Wainwright, the Assistant General Manager, and Mr. Wright, the Treasurer of the Grand Trunk, and Mr. Drinkwater, Secretary of the Canadian Pacific, are from the same stock, whilst Mr. Sargent, the Traffic Manager, and others went from lines in the South of England. Many lines in Mexico, Brazil, the Argentine Republic and Peru are almost exclusively built by English companies and officered by English engineers and traffic managers. Great Britain is, probably, the only country in the world which is able to say that not one mile of its railroads has been constructed by foreign capital; and, probably, not one administrative position is held by other than British-born subjects. Railway men in America cannot fail to be interested in the kind of officials bred from the sturdy old stock, and in the systems of administration and operation developed by them.

The English railway service, while possessing many solid excellencies—among which incorruptibility is not the least—is not that homogeneous, symmetrically arranged system that many suppose. Like Topsy, it was not made, but "grew." It is the product of nearly half a century's inconsequent developments and changes. That mighty potentate of to-day, the general manager, had no legal or practical existence 40 years ago. The secretary was everybody then. In later years his powers have been lessened, though his emoluments remain largely unimpaired, if not increased.

It may be said that the first authentic recognition of the general status of the English railway officer is contained in the "Railway Clauses Consolidation" and "Companies Clauses" acts of 1845. These acts are an epitome of several restrictions, regulations concerning public rights which Parliament was wont to insert previously in *extenso* in the special acts procured by different independent companies. Acts passed since 1845 simply incorporate the whole or parts of the above acts by alluding to them by the number of their sections. It is in the "Companies Clauses Act," 1845, that the secretary first gets his legal status.

The functions of the secretary are very diverse. It is strictly his duty to receive all correspondence, to keep a register of all shareholders, to issue scrip under seal, to sign all legal notices, to convene and keep records of meetings, to keep accounts, to invite sealed tenders for stores and supplies, and, in fact, to be the custodian of the company's conscience and all its records and deeds. He receives and issues all writs and processes of law in the name of the company. He signs cheques, drafts, etc., and in some companies he is Treasurer, Chancellor of the Exchequer and Finance Minister rolled into one. A bold or an ambitious secretary can easily accrete to himself a large share of the administrative control of a company under shelter of the ancient powers conferred on the office.

Many secretaries of English railway companies blossom into general managers. Mr. H. Oakley, the present general manager of the Great Northern Railway (one of the first half dozen first-class lines) was secretary of the same company for many years, succeeding to the general management on the death of Mr. Seymour Clarke. Mr. John Bell, the General Manager of the Metropolitan Railway (London), was secretary for some years, succeeding Mr. Myles Fenton on the latter's promotion to the Southeastern Railway. Mr. W. J. Wainwright, General Manager of the Glasgow & Southwestern, was for some years secretary of the same railway.

The status and salary of a first-class railway secretary have been until lately co-ordinate with those of the general manager. As a rule they are the only two officials (except the law adviser) who sit with and advise the board of directors in their deliberations. But in later appointments to secretaryships much of the former prestige has disappeared; and the tendency is towards subordinating the office to the performance of purely ministerial and routine duties, whilst the general manager retains more influence in shaping questions of policy and executive enterprise and working. That is most notably exemplified perhaps in the case of the Midland Railway (probably the most ably directed and developed railway system in Great Britain). Under the presiding genius of its former general manager, Mr. James Allport (now Sir James Allport, and one of the directors), the company for several years shot ahead of its competitors in wise extensions of road, in providing third-class carriages by all express trains, and in the adoption of the Pullman system of cars and other improvements. The renown which this brought to Sir James Allport, himself thoroughly imbued and acquainted with American methods of railway working, enabled him not only to distance all his individual competitors in other railways, but so overshadowed the other leading officers of that company that people regarded them all as his clerks. The general manager's word was, in executive matters, supreme. The high salary that he got, almost as much as that received by the President of the United States, reacted upon other railways, and their general managers demanded more pay and more power, to place them on something like an equal footing to meet and measure strength in negotiation with this Bismarck of the railway system. In the meantime the secretaries continued, as they do to day, to draw their salaries, but their star has somewhat paled.

The duties of even keeping the transfer books, or records of stocks and bonds issued and transferred, are nowadays nearly universally performed by men with the title of registrar, the expenses of whose department are largely defrayed by the fees charged under statute for the registration of transfers and assignments of shares, etc., and for proofs of death, marriage, etc.; so likewise are many of the financial duties. Some railways have a treasurer besides a secretary, the former of whom relieves both the secretary and registrar of many of their duties.

In subsequent articles we will go more fully into practical details, showing where many of those duties begin with one officer and end with another. The lines of demarcation are, however, very faint in many cases, and though the executive machine as a whole often presents to the outside world a picture of complete cohesiveness and homogeneous working, there is a good deal of silent friction incidental to a faulty system, which nothing but the good temper and good sense of many officials preserves from utter failure. Perhaps too much effort is devoted to the maintenance of the *esprit de corps*, at the sacrifice of greater money results in working. Often, rather than confront a difficulty, there is a disposition to let things slide, lest they should provoke controversy or bitterness and hurt some brother officer's position. This is an agreeable side of business life, and makes the tenure of office pleasant; but at the same time, applying the test analysis of the inner working of English railways, and measuring them scientifically, it must be confessed that the personal transcends the business aspect of the matter. Much of this has its source in the composition of the boards of directors. Peers of the realm, county squires, members of Parliament predominate among rich retired manufacturers, shipowners, merchants or other representative men, who are at the same time large stockholders. Kindly, generous feelings toward their executive officers, and a considerate bearing, are ordinary characteristics of the British railway director. The effect is seen in the easy way in which life is taken by the heads of departments, though for honorable and conscientious devotion to duty and for singleness of purpose, and freedom from sensational allurements, there is probably not a more solid and trustworthy body of public men in the world.

A certain degree of solidarity is imparted to the relations between the officers of one railway company and those of another company by the arrangement of meetings and conferences established by the Railway Clearing House. These meetings aid greatly in the comfortable adjustments of rival interests and accommodations in practical working. In

fact it is almost impossible to suppress incidental references to this valuable institution and the part it plays in the detailed working of British railways in any review of the duties of English railway officers.

#### High Grade Roads in the Austrian Alps.

The Austrian Government has granted a charter to the firm of Siemens & Halske to make a preliminary survey and location of a railroad from Lend to Bad Gastein and Böckstein, in the Austrian Alps, to be operated by electricity. The maximum grade will be 40 per thousand, the entire length 15.3 English miles, and the cost is reckoned at about \$355,000. From the station at Lend the road will, by a series of extensive curves, avoid the high grades until it reaches a point above the falls of the river; then it will be laid through the Klamm Pass, and the bed of the river Ache, until the level of the village of Gastein is reached. This plan was adopted in preference to that of two competing firms for its cheapness and practicability. They proposed more direct lines, which would have necessitated the use of the rack rail for some short sections with steep grades which would have been unavoidable.

At the same time the Austrian Government has given its sanction for the general survey of a rack-rail road (system of Roman Abt) from Eisenerz to Vorderberg on the Kronprinz Rudolf Railway, projected by the Oesterreichisch-Alpine Montan-Gesellschaft. The length of the road will be almost 18 English miles, of which 61 per cent. will be rack-rail sections and the remainder worked by adhesion. The maximum grade of the latter will be 27.8 per thousand, and that of the rack-rail sections 67.4 per thousand. The smallest radius of the curves is reckoned at 180 metres in both cases. The total cost of construction is computed at \$1,500,000.

According to official statistics there were opened during last year for general traffic in Austria-Hungary and Bosnia 434.7 English miles of new railroads, against 335.6 miles in the preceding year, 186.9 miles were built in Austria, 206.05 miles in Hungary, and 41.56 miles in Bosnia. Of these newly opened in Austria, the Austro-Hungarian State-Railroad Company has built 59.5 miles, and the Kolozsvar Local Railroad Company 44.6 miles. The Zagorian Railroad is the longest built railroad in Hungary in 1886, being 71.8 miles long.

On April 4, 1887, the railroad Munkacs-Stry was formally opened, making the third road connection between Hungary and Galicia. Its entire cost will reach \$7,200,000. It was chiefly built for military purposes, and the commercial advantages which may accrue from it are doubtful. The line Stry-Berkid, which is 49.2 miles long, was begun at the end of 1883, and the line Munkacs-Berkid, which is 42.6 miles long, in the middle of 1884. The construction of the road presented some difficulty on account of the Berkid tunnel, situated on the border of Austria and Hungary, having a length of 1,800 metres (5,546 ft.).

#### Watch Inspection.

Brief reference was made last week to the system of watch inspection to be put in force on the Wabash Western June 1. Since then we have received a copy of the order issued by Vice-President Talmage which is, in full, as follows:

1. In order to insure greater safety of life and limb to the traveling public and to its own employés, this company will, on and after June 1, 1887, require that every conductor, engineer and fireman shall carry a watch of a certain standard of excellence, and shall have his watch examined every three months by the company examiners for a certificate as to its condition and quality.

2. The standard determined on shall be of a grade which shall be equal to what is known among the general American movements as the "15 jeweled patent regulator, adjusted to heat and cold," and protected from magnetism and electric influences by the anti-magnetic shield. This last requirement is considered of more importance than adjustment, as railroad employés are continually coming in contact with more or less magnetism in telegraph offices and upon the road, and so much electricity is being used by the public that any employé is in danger of having his watch ruined or rendered unreliable by becoming magnetized.

3. Examiners will be appointed by the company, who shall be competent watchmakers; they will be located at St. Louis, Moberly, Brunswick, Columbia and Kansas City, Missouri; Ottumwa and Des Moines, Iowa; Peru and Butler, Indiana; and Detroit, Michigan; their names and addresses will be given in a subsequent circular.

4. Each person designated in this order will be furnished with a certificate which he must take to one of the company's examiners, and if his watch is accepted the examiner will sign the certificate and return it to the head of the department in which the owner of the watch is employed.

5. When a watch is examined and does not fill the required standard, it must be replaced by one which will. A watch rejected by one examiner cannot be passed upon by another.

6. The expense of examination will be borne by the company, except as provided in Section 7.

7. Where watches need cleaning and repairing they may be left with the company's examiner for that purpose, if the owner so desires; but if he prefers to take it to his own watchmaker, he is at liberty to do so; the watch he carries during the time his own is being cleaned or repaired, however, must be examined by the company's examiner, and for this examination the employé must pay twenty-five cents.

8. Where watches are left with the company examiner to be repaired, a watch will be lent by him to the owner to be used during the time his watch is undergoing repairs.

9. Any variation in watches as compared with the standard time of the road, must be noted on memorandum blank in the back of the case, once a week. This blank, with directions, will be furnished by the examiner.

10. In order that there may be no hardship imposed on our employés by being obliged to replace watches now carried, and which do not come up to the standard specified, the company has made arrangements with the examiners to carry a grade of watches of the required standard of excellence, and with either gold, silver or filled cases, containing the anti-magnetic shield (without extra charge) and at the minimum cost of same, and will also allow payments to be made on the monthly or installment plan, to be deducted from the roll of the employé.

While it is not required that employés shall purchase their watches of the company examiners, the above arrangements make it to their advantage to do so.

A. T. TALMAGE, Vice President and General Manager.

#### Iron Tubular Cars.

The Philadelphia & Reading Railroad Company is having built at its shops 100 iron tubular cars. These are said to weigh less than wooden cars of the same dimensions, and to have a carrying capacity of 60,000 pounds.



Published Every Friday,  
At 73 Broadway, New York.

#### EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for networks or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns our own opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The Canadian Pacific seems just at present to be the thorn in the side that is giving newspapers severe attacks of insomnia. By threatening to buy up the Boston & Maine (and with it nearly everything else north of Boston), to build parallel to the Michigan Central from Canada to Chicago, and to carry freight at less than cost from San Francisco to the Atlantic seaboard, it gives the impression that it expects to do about all the freight business of the country if it can get a chance. It should be remembered, however, that the transcontinental freight is a comparatively small thing to fight over, and that much of it has heretofore been carried at little or no profit, and even at a loss. Whole train loads of tea at \$1.25 per 100 lbs., San Francisco to New York, can be very much more complacently parted with than could a very little local traffic at the rates the Pacific roads get. A traffic agreement with the Michigan Central by which the Canadian Pacific could get a share of the Chicago and St. Louis east-bound shipments might well be worth more than all the Pacific Coast freight; though if the Canadian line took grain, provisions, etc., to Boston or Portland it would come under the Inter-state law, and so be on the same footing as compared with the roads in the United States as it would if there were no such law. The control of the Boston & Maine or of the Central Vermont may, however, be as long in coming to a head as the Baltimore & Ohio deal.

The arrangement between certain roads, looking to some definite action on the question of uniform freight car couplers, which has been under consideration for some time, has now reached a decidedly hopeful stage, and we publish in another column some interesting facts concerning the agreement which these roads have entered into.

The complexity of the interests involved in this matter is so great that it would seem that all concerned ought to welcome a prospect of decided action. Notwithstanding the valuable work of the Master Car Builders' Association, the reform has seemed to drag; and some arbitrary action is apparently the only way of accomplishing immediate progress. Even the multitude of inventors, who must inevitably fail of receiving the prize, should for many reasons look with satisfaction on any thing tending to end the present suspense.

The roads that have entered into this agreement include a number whose lines spread into a large territory and have extensive connections, so that their action will naturally have an influence on many other roads; and the board of experts selected includes some of the best known railroad men qualified to conduct such an examination, and its decision will be entitled to respect. All the reasons which should impel managers to vigorous action in this matter not only continue to exist, but are intensified as time goes on. Increase of cars and of railroad mileage only makes the loss and inconvenience from multiform and unscientific devices worse and worse; and the highest and

strongest motive of all, that of humanity, is still emphasized by the weekly maiming of dozens of our fellow men, the horrible work going on resistlessly whether we shut our eyes to it or not.

One of the latest "trusts" to be organized is the American Cattle Trust, and this, perhaps, the first one for which the newspapers have hoisted the anti-monopoly flag. Heretofore the money of investors has been put into trusts with the avowed purpose of establishing monopolies, and it is a great misfortune that some of them have succeeded so well. The monopoly has been so complete and the profits so inordinate that men are stimulated to find new fields for trusts, and the word seems to have a mysterious power to conjure money out of the pockets of speculative investors.

The American Cattle Trust, however, besides the chance of controlling an important part of a great industry, will be in the popular position of an organized opposition to an existing and powerful dressed-beef "monopoly." It is said to include a number of prominent cattle men, who hope to thus get better prices than the Chicago combination has permitted. How far they will succeed remains to be seen; but whether or not the cattle business has been overdone (considered from the producers' side) or whether or not existing combinations of slaughtering establishments have been able to buy too cheap and sell too dear, the ultimate good to be secured through a "trust" is very doubtful. The very name should cause it to be looked on with suspicion. A corporation is a creature of the law, with definite powers and liabilities, subject to the scrutiny of officers of the state, and liable to be called to an accounting by any of the stockholders. Whatever may be said of the growing power of corporations in society we know their limits and their uses. But this new thing, which has grown up under the name of "trust," is so far unknown to the law, and its methods are hidden even from those who risk their money in it.

Its very object is to enable a few men to handle the great power of an enormous capital without being too much hampered by legal restrictions as to the scope or method of their work or the method of their accounting. It has been fabulously successful, but in its very nature it is liable to gigantic abuses, which in many instances will inevitably lead to disaster.

The men who have organized the American Cattle Trust are doubtless honorable and public spirited, and probably they see no other way of getting a fair chance in the market than by a combination so powerful as to be able to make its own terms; but it is to be hoped that they will be content to compete fairly and not resort to trade union methods to crush out the small producers who choose to keep their independence. Much of the misguided public feeling against corporations comes from the spectacle of the unrestrained performances of these powerful bodies which are not corporations, but "trusts," and it will not be long before people will learn the distinction.

#### RAIL SECTIONS.

"Argument on standard rail sections will only be possible when the reasons for adopting one form of section rather than another are thoroughly understood," and therefore it is with pleasure that we give place in this issue to another letter from Mr. Sandberg, and reproduce the section proposed by Mr. Forney in the current number of his *Journal*. We hold that the main point is to increase the weight and improve the quality of rails. Present practice is so far settled as to the type that there is no danger of the large use of any very bad section. Study, discussion and experiment can only result in the slow modification of forms in use, and a slow approximation to the perfect standard section. But, keeping always before us the great importance of bringing the weight of the rail up to a proper relation to the weight and speed of modern rolling stock, it is well to keep the minds of rail makers, designers and users at work on the details of the section.

In passing, it is interesting to notice the combination in the Irish rail of 1868 of those departures from recent practice which are most noticeable in the sections of Mr. Forney and Mr. Mattes. The fact that it was rolled in 1868, and perhaps never since, does not prove much. The ill-proportioned and ugly thing deserved a speedy death.

The objection is raised by Mr. Forney to Mr. Mattes' form of web that the web should be made thinner rather than thicker. That is precisely what Mr. Mattes' design may accomplish, by so disposing the metal in the web that it shall be where it is wanted to resist the stresses to which it is subjected. If half an inch is enough at the base of the web it is too much at the neutral axis, and it may be made still lighter

than Mr. Forney's web. But Mr. Sandberg says that the web requires thickness to resist abrasion from the fish-plates as well as corrosion. To this it may be said that when the fish-plates or angle-bars support the rail by rubbing against the web, it is time to do something else than add to the thickness of the web. It is time to find a joint that will hold the rail up, and not lean against it. The loss of thickness by corrosion can be but slight under ordinary circumstances. By the time the web corrodes to dangerous thinness, the rail will pretty certainly be worn out in other parts. That was strikingly the case in the rail referred to in Mr. Sandberg's letter, the web of which had lost 30 per cent. from corrosion. The flange and head were even further reduced, and the rail had long been extremely dangerous, but not because the web was thin. Unquestionably a rail requires a certain mass to resist the blows it receives; but if that mass can be put into wearing parts it serves a double purpose.

Mr. Forney's proposition to make the upper and lower splice angles unequal, and to make the upper angle 30° and the lower one 10°, seems especially objectionable. From the fact that the outward thrust on the angle bar would be so much greater at the top bearing than at the bottom, it would follow that every passing wheel would tend to tip the splice outward, and bend the bolts, and we should have new and complicated stresses on bolts, nuts, and angle bars. This evil might be unnoticeable were the difference of the angles less, but with a difference of 20° it would probably be great. It is quite true that with the greater angle "any inaccuracy of fit of the fish-plates on the rails permits less lateral deviation of the rails than a smaller angle would;" but it would also permit a greater vertical deviation, and the chief use of the joint, of whatever form it may be, is to hold the rails level, rather than in line. But the greater splice angle is not only inferior to the smaller angle for the purpose of keeping the rails to the same level when the fit is inaccurate, but if the fit were perfect the joint would still need to be stronger to do the same work with an angle of 30° than with an angle of 14°. This is, of course, too obvious to need any demonstration. But it may be an open question whether an angle of 30° is steep enough to bring undue lateral strains on the joint. In Mr. Holley's paper of 1881 is this testimony: "Mr. Chanute experimented in this direction, also and found that with angles above 15° the plate was loosened by the stretching of the bolts; this relieved the pressure and friction of the plate against the nuts and allowed them to turn. He therefore adopted the angle of 15° under the head. To avoid unnecessary metal in the flange he made its angle 12°."

But there is another aspect of this whole question of the form of the head. Why should so much ingenuity and argument be expended in designing a rail of a form best adapted to a fish-bar? Why not begin the other way, and make a rail theoretically correct for the work it has to do, and make a joint adapted to such a rail? For a good many years the tail has wagged the dog. To be sure it is a big tail, but the dog is big too.

#### FREIGHT RATES AND CLASSIFICATION.

Any system of classification is the result of a compromise between a vast number of different interests. The man who defends such a compromise is apt to be charged with inconsistency. In one sense, we plead guilty to the charge. Tried by any one standard, whether that of the shippers, the railroads, or the vast section of the community which wants additional railroad development, the new classification has many faults. We defend it, because we think it a reasonably good attempt to reconcile the different claims: not so good as we may hope to have in the future, but better than what we have had in the past.

We do not for a moment forget the public responsibilities of the railroads; but the attempt to enforce them too rigidly at all points either breaks down by its own weight or produces a reaction which stops the development of the railroads and community alike. In the ordinary details of management, railroads have to be treated as private business rather than as public servants. This is as true of the state railroads of Europe as it is of the private railroads of England or America. It is only when their business methods lead to special abuses that the special responsibilities need to be enforced; and here the question is not so much what theory we should like to apply as what we actually can accomplish. Too much regulation practically means no regulation at all. There is a point beyond which any multiplication of rules means a still faster multiplication of exceptions.

Of all the violations of public responsibility on the

part of the railroads, the worst are those connected with the system of special rates, rebates and personal discrimination. We take direct issue with our correspondent, whose letter is published on another page, when he says that "it is just as bad to bear such discriminations in the form of classification as in the form of rebates." In the first place, an open difference is always better than a secret one. In the second place, many of the worst abuses are avoided if the lower rate is open to all on the same terms, even if many men are unable to meet those terms. As far as quantity allowance prevents competition between different dealers, it is bad, but it does not prevent it in so arbitrary and destructive a manner as the system of secret rebates and special contracts.

There are many respects in which the new classification is probably imperfect. It is beyond the power of human skill to devise a perfect classification. But we believe that the underlying principles are substantially correct. We believe, as we said in last week's issue, that it is a choice between special rates or quantity allowance; that an attempt to stop both at the same time will be fruitless, and that quantity allowance is much the better system of the two. Nor is the difference between parcels and car-load rates so unreasonable in amount as our correspondent assumes. It seems likely that the ordinary expense of shipment in parcels is from 30 to 40 per cent. higher than that in car loads. The collection and grouping of such small items of carriage is not a good business for a railroad company to undertake. Witness the doubtful success of the attempt of railroads in Massachusetts to do their own local express business without the agency of an intermediate company.

A single practical instance is worth a whole chapter of theory. Prussia is the country which has labored longest and hardest to abolish special contracts; and as far as *secret* discrimination goes they have had good success. But in so doing they have abandoned the cruder tariff schemes with which they started, and have adopted a schedule which, besides its "exceptional" rates for special articles, makes an enormous difference between parcels and car-load rates. The charges per ton per mile, exclusive of terminals, are approximately as follows:

	Cents.
Express.....	9.
Parc-Is.....	4.5
Half car loads (general rate).....	3.
Whole ".....	2.5
Half car loads (cheaper goods).....	2.
Grain, etc.....	1.8
Lumber, etc.....	1.4
Coal, etc.....	1.

It should be noticed that the general rate for parcels is *eighty* per cent. higher than the general car-load rate. This is what the typical state railroad system has done in the attempt to secure equality between different shippers. With matters under its own control, with competition practically destroyed, and with a force of a hundred thousand officials at its command, the Prussian government still retains this allowance for quantity, greater than any of those of which our correspondent complains.

If this is the best which they can do after years of organized effort, what can be expected of our own roads in their first attempts to adapt themselves to a system of new and in some respects ill-devised conditions imposed by the Inter-state Commerce law?

#### CROSSING STOPS.

The use of power brakes for passenger trains which, beginning in 1869, has now become universal, gives rise to a new problem, which is engaging the thought of many superintendents, to wit, the question of keeping brakemen in practice; and connected with it is the question of the best method of stopping trains at draw bridges and grade crossings or other specially dangerous places. On this latter point the arguments are so evenly balanced that many seem in doubt as to which is preferable and safer, to stop by hand or by power and the practice in vogue is doubtless often continued simply because no great preponderance of reasons has been found to exist in favor of either plan.

It is certainly desirable to keep brakemen in the highest state of proficiency. Engines and brake apparatus, notwithstanding the present advanced degree of perfection to which they have been brought, still fail occasionally, and the old school brakeman who, with muscles like a blacksmith's and gloves an inch thick, prided himself on stopping trains so suddenly as to "bring the passengers up standing," ought still to be kept on deck; we cannot spare him. Those roads which have supplanted him by a modern species whose chief merit is the ability to dress neatly, or the willingness to work for low wages, or the faculty of remaining so inactive as to never have a disagreement with an overbearing passenger, have made a mistake. Brakemen should be instinctively neat, of course; they should be men

of enough judgment to gracefully enforce the rights of weak or modest passengers, as against selfish four-seat occupiers, even when the latter threaten to appeal to the superintendent; but, after all, the brakeman's first qualification should be his skill in stopping trains very quickly; and in this line nothing but practice makes perfect. So long as freight trains are managed by hand brakes, the freight force is the place from which to recruit the passenger ranks, so that, so far as new men are concerned, there is no great trouble, except for those who man their passenger trains with non-railroaders. For these, and in the case of old brakemen who have been on passenger trains so long as to get rusty and careless, care is needful.

Everybody acknowledges that stopping by hand wastes time; the most skillfully organized crew would have to be very alert to even approach the lively work of air at 75 lbs. pressure, so that the latter should not at any time be disused, except for positive advantages in the way of safety. To habitually spend two minutes on a certain stop when the power brake would make it in one minute, merely to keep brakemen in practice, would be clumsy indeed. Where a full stop is not regularly made, and the speed has merely to be brought under control, as in the case of crossings provided with interlocked signals, any loss of time seems still more wasteful, because every one naturally expects that under the improved plan all delay will be obviated. Whether a train actually stops, or only prepares to stop, the means used should be the same, if only for uniformity. When a train is to be held by hand the engineman is tacitly understood to be on the watch, and to avert disaster if the brakemen forget; and when the duty of slackening or stopping is laid upon the engineman, the brakemen are in like manner supposed to be ready to make up for his possible neglect.

Those roads which require the men to apply the hand brakes and then authorize the engineman to whistle "off brakes" (if he find it safe to let them off) as is done on the New York, New Haven & Hartford at its drawbridges (where, if the track is clear, no stop is required), without doubt regard safety as the principle consideration, however important they may deem the question of keeping the men in practice. The theory is, that the engineman shall do the braking, but that the brakemen shall, by their action, remind him when to do it.

This, if properly carried out, undoubtedly is, in the long run, a valuable safeguard, and ought, with equal reason, to be applied to all crossings. To have the brakemen act as a check on the engineman's forgetting to stop, and then have the fireman restrain him from ordering the brakes released before the track or signals show clear, is a triple protection, and can be objected to only on the ground of being excessively cautious; which, in view of the radical measures proposed in the legislatures and in the newspapers whenever a collision occurs, is an objection that should not be lightly offered.

This triple plan requires close supervision, though; firemen find it easier to leave the whole matter with the engineman than to act as his constant censor; and brakemen, to make sure of being safe, will begin putting on the brakes a quarter or half mile too soon; so that constant watchfulness on the part of the officer who looks after the men on the engine, and careful discipline by the conductor to keep the brakemen in line and acting in exact unison, are absolutely necessary. Otherwise, time will be wasted in slow stops, or else the men will carelessly trust the whole matter to the engineman. With the Westinghouse automatic, runners like to have the brakemen keep away from the brake, because in applying the pressure suddenly the slack is likely to be taken up so quickly that the brake wheel may be turned backward with considerable force and wrench the arms of any one who may at that moment be turning it (if, indeed, it does not throw him down); the runners, therefore, like to give the two blasts of the whistle before the men begin to apply the brakes, and unless cautioned against it will naturally do it a long distance from the stopping place, and thus virtually defeat the object of the plan, which is to have two parties, those on the engine and those behind it, both on the watch, not simply while approaching the point of danger, but until it is reached.

Those who are in doubt whether the employment of hand power for this kind of stops is worth enough as a safeguard to pay for the time it uses up, should, therefore, as a first step, take measures to see how much time is actually consumed, and whether or not the average crew can be trained to perform the operation in less time and distance than is usual. It certainly is desirable to have a double watch, even allowing all that may be claimed for the reliability of the very best brake, for nothing is more surely settled than that men will forget; and all will doubtless agree

that it is better to have the brakemen watch the engineman than for him to watch them.

As for keeping brakemen in practice, they doubtless taught in many cases to have more varied practice than the average number of grade crossings would afford them. This can be provided in various ways; certain days might be designated on which they should make a portion or all of the station stops; and where there are any considerable grades the hand brakes could be used as a regular thing in descending. With the Westinghouse automatic the speed of a train on long descending grades can be kept uniform only by applying and releasing the pressure a good many times; runners lack the patience to do this, and as a result passenger trains are by many of them habitually "let down the hill" at a very uneven rate. The skillful use of the hand brakes would obviate this unpleasant feature.

#### Explosions and Detonations.

In another column, a correspondent asks some questions about the behavior of gunpowder and various nitro-glycerine explosions. There are no known facts giving support to any other theory than that the force of an explosion proceeds on radial lines, whose length is governed by the resistance of the medium through which they pass.

Some text books define a fluid as a substance, the particles of which pass over each other on the application of the slightest pressure, but water and air present some of the physical phenomena of solidity if a body strikes them with sufficient velocity, and so nitro-glycerine exploded in the air meets with sufficient resistance to exert a destructive action downwards. This action may not be noticed where small quantity of gunpowder is exploded on the ground, as the slower rate at which it evolves gas allows the air to acquire motion. An experiment with two fulminates of mercury caps—the most violent explosive we have in use—one covered and the other uncovered, will show that the reactions are of equal intensity in all directions. Nitro-glycerine and all nitro-glycerine compounds, when pure and in small quantities, can be safely burned in the open air when ignited by a match. This sputtering combustion may be called deflagration, and gunpowder, when damp or fine enough, burns in the same way.

Either gunpowder or nitro-glycerine when confined can be made to *explode* with greater or less energy; in the case of gunpowder, direct contact with some red hot body seems necessary; nitro-glycerine will explode from shock or heat or both combined.

If the shock and heat are sufficiently great, both gunpowder and nitro-glycerine compounds will *detonate*, giving out their greatest known energy. This last is sometimes called "an explosion of the first order," while the explosion from heat or low power or tension fuses is called "an explosion of the second order."

Neglecting deflagration as of no industrial importance, we find that in practice both nitro-glycerine compounds and gun powder can be exploded with different effects, depending on the violence of the impulse communicated to them, their void spaces, and their temperature at the time of the explosion. There is a doubt on the part of some if the temperature of the explosive has more influence than in the case of water to be converted into steam, but there is no doubt that a much heavier charge of fulminate is requisite to explode cold nitro-glycerine than warm.

Roux and Sarrau have investigated the effectiveness of exploding and detonating various substances and have reached the following comparative results:

	Explosion.	Detonation.
Fulminate of mercury.....	928	
Gunpowder.....	100	434
Nitro-glycerine.....	480	1,013
Gun cotton.....	300	646
Picric acid.....	204	550
Potassium picrate.....	182	538

It will be noticed from the above that while nitro-glycerine may, when detonated, be ten times as effective as gunpowder exploded, with the circumstance reversed the two substances would be about equally effective.

Messrs. Roux and Sarrau have determined the following heat units and volumes of gases:

	Heat units.	Volume of gas per kilogramme.
Gun-cotton.....	1056.3	720 litres.
75 per cent. dynamite.....	1290.0	455 "
Potassium picrate.....	787.1	576 "

These experiments show that there is no ascertained general ratio between the effectiveness of explosions and detonations, nor between the heat units evolved and the volumes of gas produced. The temperature at which various explosives are ignited is given as follows, all in the open air:

Fulminate of mercury.....	392° F.
Gunpowder.....	563° F.

Nitro-glycerine..... 494° F.

Fulminate of mercury, it is thought, detonates at the above temperature with a violence nearly equal to

the detonation of nitro-glycerine; all the others deflagrate. On account of its combined low temperature at ignition, energy of detonation and comparative safety, fulminate of mercury is universally used in fuses, and the shock imparted by it, when in sufficiently large amounts, will, it is thought, always cause detonation either in gunpowder or nitro-glycerine or combinations of nitro-glycerine with powder or infusorial earth.

In detonations the explosion of the nitro-glycerine is complete; or, a different gas is produced from that by an explosion of the second order. It is not certain which of these two theories is correct, but there is no doubt that in a simple explosion red fumes are given off which will cause the "nitro-glycerine headache," and these fumes in practice are not absorbed where the blast is under some depth of water. The gas from a detonation, either under water or in the open air, will not give the nitro-glycerine headache, and is colorless.

A marked difference in the destructive action, resulting from the explosion of a large quantity of gunpowder or nitro-glycerine, has been noted. While both shatter objects near them, gunpowder, for some distance, levels everything in its path, while nitro-glycerine tears doors, windows, clapboards and shingles from a building, throwing nothing into the house, but even at a few hundred feet leaving the house standing. This circumstance seems to justify a theory that where gunpowder is exploded in the open air or under slight confinement, the gases produced travel with about the same velocity, but in the case of nitro-glycerine they have different tensions, and in passing a structure produce more or less of a vacuum, thus throwing things from the house instead of breaking it down, or, even on the exposed side, crushing in the windows, unless the house is near the origin of the explosion.

There is another circumstance connected with the firing of high explosives. Cartridges will communicate explosions to those near them through only a certain number, the vibrations losing either intensity or force, so that the more distant cartridges will not be exploded. It was a knowledge of this fact that led the engineers to place in each cartridge used at Flood Rock, in this harbor, an exploder loaded with 30 grains of fulminate of mercury and one ounce of dynamite. And in general where it is desirable to obtain a first-class explosion and develop the full shattering effect of any blast, it is well to put reinforce exploders in the charge, if it is either a heavy charge or is in a deep bore hole.

#### The Public Mind and the Inter-state Law.

Publicity, the bringing of all disputed questions before the reading citizen, appears to be one of the inevitable necessities and safeguards of a free government, and we cannot be too thankful that it is such an interesting and even amusing process, giving the dries and most technical questions a kind of human interest such as is found in the spelling school and the juvenile debating society. Large questions, too big for any single mind, reduce us all to little boys, each with a side to maintain with "arguments of great weight."

Such a question is the railroad in its relations to private and public interest. It is a perfectly simple question on paper, and fifty or sixty review and newspaper articles have settled it in the most logical way. The difficulty begins when an iron road, with bridges, cars, freight agents, and a vast and intricate traffic must be taken into account. This the Inter-state law is revealing with the most perplexing definiteness to the reading citizen, who, after his numerous review articles, felt himself "well up" in railroad affairs.

Now he has an excellent opportunity to be sensible, and honestly acknowledge to himself that he knows, after all his reading, practically nothing about the real railroad. When the general public and the writers who are "enlightening" the public mind have once reached this conviction, a new era will begin. We do not mean to assert that all the clearly expressed "thought" on this subject in the public prints has been useless—quite the contrary. "Gentlemen," said a professor of engineering to his class, "I wish you to understand that when you leave this college, you will not be engineers. You will only have been prepared to learn your business."

This ought to be the state of mind of nearly every one who is called to deal with this vast and intricate series of questions. For even those who know traffic thoroughly, do not necessarily know administration, which is by far the larger side of the problem. All the questions involved could be solved by a corps of experts, if only human nature had not to be taken into account. It is with human nature that administration deals, and therefore the absurdity of modern review articles and symposiums by men who have never had to do with either government or railroad affairs, and set up

for infallible guides for the direction of the public mind.

Fortunately, however, the practical citizen fears the too logical man, and is inclined to accept the new, valuable and most dangerous theory of "experiments" in legislation, of which the Inter-state law is a concrete example. The method is costly, and, as we have said, dangerous, but having attempted to use it, all sensible men must agree that the only reasonable course is to become patient students of the situation, ready ever to appreciate the force of the discovery that our prophesies come true in ways and from causes never anticipated.

Fate often seems quizzical rather than logical—we get there, but just the other way proves the right one to that point. Unlimited competition for traffic, unlimited opportunity for more individual energy in securing business ends in a cry for regulation, and a regulating act immediately raises a multitude of demands that its rules be suspended.

But the grim humor of such great events as the working of such a law touching commercial affairs, has not less relish for any doubt what the end may be. No men, perhaps, more thoroughly enjoy the quiet fun furnished by the "cock-sure" man, than those whose own convictions are sober and sincere. The belief in freedom, which is a negative expression of confidence in the better side of human nature, in justice, in honest dealing, keeps the mind from any little anxieties about its inability to be "dead sure" about many public questions, and those who hold these convictions and know the railroad problem as a real question do not find it difficult to be at once earnest against all attempts to convert this government into a business enterprise, and yet able to relish the gentle entertainment which men of all parties are furnishing free of expense, in their attempt to dogmatize upon such intricate and untried questions as are now getting public attention.

The problems connected with the railroads' governmental supervision are most important ones, and the reading citizen will have received an excellent education upon many technical points of traffic management before he is through with them. His principal danger, and that, too, one which threatens men in railroad service, is the loss of his intellectual grip on fundamental questions by his attention to a vast mass of details.

#### Accidents on English Railroads in 1886.

The English Board of Trade report for the year 1886 gives the number of train accidents in the United Kingdom as 1,618, including 118 collisions, 79 derailments and 1,195 failures of tires and axles. This last item, of course, makes the number of casualties per accident very small. The number of passengers hurt, 615, must include many whose injuries were very slight, so that this item also is worth very little for comparison with American figures. The report shows only eight passengers killed, and six of these were in one accident, the derailment on the Great Northern, near Portadown, Ireland, June 30, so that the immense traffic of England and Scotland was conducted for the year with only 2 fatalities to passengers from train accidents proper. This number is greatly increased though when we come to include those whose injuries are (generally) from their own fault, as in falling between cars and platform, crossing tracks in front of moving trains, etc., there having been 87 killed and 727 injured from this class of causes, bringing the totals up to 95 killed and 1,342 injured; and this, be it remembered, covers passengers only; so that although the well-known statement that the inside of passenger trains is the safest place in the world may be true enough, it is well to bear in mind that the getting to and from this place of security is an important factor in the problem. When we come to include the 2,435 employees and 605 "others" (which covers 80 suicides) we have the appalling totals of 988 killed and 3,539 injured. This is on about 19,000 miles of road; what the figures would show on our 187,000 miles is frightful to conjecture. We, of course, have a very much smaller train mileage per mile of road, but our national habit of free and easy carelessness would perhaps offset a portion of this.

The report of casualties to employees shows a curious discrepancy between the figures of the different countries. Those for England and Wales show more than 5 hurt to 1 killed; those for Scotland a little less than 3 to 1, while Ireland reports only 32 hurt to 20 killed, about 1½ to 1. Either there must be some slippage reporting, or else the Irishman must be exceedingly tough. It would appear that there is no use in pitching into one of them, unless one is prepared to finish up the job and kill him "entirely," at least 2 times out of 5.

The bulk of this voluminous report is taken up with inspectors' special reports on 37 of the more serious train accidents. More than half of these are made by Major-General Hutchinson, the other inspectors being Colonel Rich and Major Marindin. They go very minutely into particulars, giving all the testimony of trainmen, etc., in full. Their conclusions and the evidence show that the value of the elaborate and costly signal apparatus in use there may be impaired or nullified by parsimony or poor discipline, the same as in the case of more commonplace appliances. We are accustomed to

think of English practice as pretty nearly perfect in its complete and systematic provisions for safety and convenience, but the facts brought out show that engineers forget to look at signals, signalmen omit proper precautions, inspectors neglect to report and correct habitual carelessness, etc., much the same as weak mortals do on this side.

A noticeable point in the reports of testimony is the long term of service which many of the railroad employees tell of. Most of the men begin "I have been in the employ of the railway company 20 years," or 15, or 30, or whatever it may be. A very large part have seen 20 to 30 years service; and one that we noticed said 36, those of less than 8 years are scarce.

#### Atchison, Topeka & Santa Fe.

The report of this company for the year ended Dec. 31, 1886, has just been published. The road, proper, embraces what is termed the Atchison & Southern Kansas systems, forming a net work in Missouri, Kansas, Colorado, New Mexico and Texas, covering a distance of 2,526 miles. Its auxiliary lines, which are owned in whole or part, extend for 2,823 miles, making a combined system of 5,349 miles, with termini in the East at Kansas City and Atchison, and in the South and West at Galveston, on the Gulf of Mexico; El Paso, on the Rio Grande; Guaymas, on the Gulf of California, and San Diego, on the Pacific Ocean, thus covering and draining an immense territory. While, however, it has been extending its road to extreme points in the South and West its Eastern termini remain the same, making it dependent on lines which compete with it at many points west of the Missouri River (Missouri Pacific, Chicago, Burlington & Quincy and the Chicago-Rock Island lines) for rates from Chicago, which, of course, are made as unfavorable as possible to competing points. All this, however, will soon be changed, the company having commenced the construction of a line from Kansas City to Chicago, which will be 450 miles in length—the shortest route—and run through a country sufficiently populous and productive to furnish a good local traffic. Before the close of 1887 the management expects to have over 8,500 miles of its own and auxiliary lines, exclusive of the Chicago line, which, with its branches, when finished, will make a grand total of 7,000 miles.

The road proper has increased, from 1874 to 1886, from 508 miles to 2,526, or five times; the capital stock and funded debt from \$22,584,000 to \$110,160,550, or 4.9 times; the gross earnings from \$1,250,805 to \$15,984,307, or 12½ times, and the net earnings about the same. Both gross and net increased so much more than the increase in mileage or capital invested, thereby showing that the extension of the line has been wise and profitable. Moreover, the usual 6 per cent. dividend has been declared this year, which is a convincing argument to the stockholders and the public as well.

Deducting from the liabilities \$12,284,000 of first-mortgage bonds on operated roads, and from the assets the same amount, the properties being held as against the guarantees, and we find that the

Assets of the company are	\$132,748,444.25
To which add bills receivable on account of land sales	1,178,256.00

Total	\$183,926,700.25
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Liabilities	121,942,302.76
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Leaving a surplus of	\$11,984,397.49
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Included in the assets are amounts receivable from agents, railroad companies, etc., amounting to \$6,770,258.73. This is unusually large, and it is possible may include a considerable sum that is uncollectable; \$3,034,173.63 of the above mentioned surplus has been permanently invested in the property of the company.

There was expended during the year for construction \$8,653,386.98, of which \$7,650,543.43 was on account of new roads.

The mileage of the road proper increased 5.4 per cent., but the earnings only 2.6, and this, too, as against an increase in the tons one mile from 607,753,550 in 1885 to 687,399,093 in 1886, and an increase in the passengers one mile from 149,999,427 in 1885 to 176,810,489 in 1886. The small increase of earnings under such favorable conditions is accounted for by the decrease in rates, both for freight and passengers, the former having decreased from 1.784 cents per ton per mile in 1885 to 1.615 cents in 1886, and the latter from 2.593 per passenger per mile in 1885 to 2.277 cents in 1886.

The increase in operating expenses was only 3.4 per cent., notwithstanding the large increase in traffic. The decrease, however, in "repairs and renewals of roadway and track," \$158,739, and in "repairs and renewals of locomotives," \$62,166, under the circumstances is anomalous, and leaves the impression that the economies in these matters have been too drastic, and will have to be covered by future expenditures.

The surplus from the year's business on the road proper after the payment of interest and dividend was	\$1,361,756.80
On the whole system was	1,048,391.35
Of which there was applied on account of sinking funds	311,340.00

Leaving net surplus from operation	\$737,051.35
Add net receipts from land sales	1,126,652.11

Net surplus for the whole system on all business	\$1,863,703.46
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Considering the decrease in rates, the outcome for the year should be a source of congratulation to the management.

The Hartford *Courant* publishes the following table of highway grade crossings in Connecticut. It is imperfect and unsatisfactory because it does not show how much effort a road may have made to cure this evil. The largest road, for instance, shows a constant increase in the number of cross-

ings, and yet it may have been spending considerable sums in putting up bridges only to be balanced or more than balanced by new streets and roads which municipal authorities are, it appears, constantly desirous of adding to the existing number.

## GRADE CROSSINGS IN CONNECTICUT.

	1873.	1875.	1882.	1886.	Ive. or Dec.
N. Y., N. H. & H.	171	176	197	205	I. 34
N. Y. & N. E.	141	154	224	222	I. 81
N. H. & Northampton	82	90	86	78	D. 4
North & Worcester	39	34	34	34	D. 5
New London Northern	71	71	71	71	
Housatonic	91	93	118	126	I. 35
Naugatuck	54	49	43	43	D. 11
N. Y., & Boston	15	17	17	17	L. 2
Shore Line	71	68	67	67	D. 4
Harford & Conn. Valley	60	58	60	60	
Harford & Conn. Western	74	74	74	73	D. 1
Danbury & Norwalk	61	61	66	66	L. 5
New Haven & Derby	20	19	19	19	D. 1
New Canaan	10	10	10	12	L. 2
Watertown	3	3	3	3	
Rockville	6	6	6	6	
South Manchester	4	5	5	5	I. 1
Air Line	52	51	51	51	
Colchester	2	2	2	2	I. 2
Connecticut Central	33	33	35	35	
Sheepscot	32	37	37	37	L. 5
Meriden & Cromwell			15	15	
Total	1,005	1,112	1,223	1,247	
Net increase in 13 years (24 per cent.)				242	

Prince Frederick Leopold, grandson of the Emperor William, passed over the Cheapest, Best and Quickest American road the other day, and, an excited reporter says, refused to allow the American sovereign, who acted as custodian of the torpedoes and tail-lights on his train, to enter the private car in which he had a half-dozen or so of other princes, counts, drummers and other noblemen. This car being at the rear end of the train the American had to ride all the way from Quincy to Galesburg on the platform, where a cold rain and wind storm depressed his temperature 1.37 degrees and his spirits 95 per cent., neutralizing all the good effects of the superior purity of the atmosphere as compared with the stale cigar smoke inside. The C. B. & Q. must provide cabooses for its trainmen; the one with the slideometer in it could be used to advantage (unless the royal passengers happened along during the brake trials). In case the wines proved too lively the princes could perhaps be transferred to the longitudinal trough for convenient transportation. But whether this scheme be favorably received or not, something must be done, or royal travelers will be giving their patronage to the Canadian Pacific, which has its men trained so that they know better than to try to intrude among their betters. This would precipitate all sorts of international complications, and perhaps be the last straw to break down the Inter-state Commerce act.

Last Monday the *New York Evening Post* had the following dispatch from Berlin: "The so-called American paper wheels for railways have proved unfit for the purpose. Hence all the German railway managers have discontinued their use." Just what is back of this dispatch we do not know, or why it should have been thought sufficiently important to be cabled across the ocean for the information of the American public. No American paper car wheels are exported to Germany or used there. Some years ago less than a half-dozen wheels were sent over, and it is probably some modified form of paper wheels, made in Germany, which has been tried there with an unfavorable result; but "American" can be only a local name for them. The paper wheel has been in use in America since 1871, and from 60,000 to 70,000 of them are now in service. They are used on locomotive trucks, on passenger cars of all kinds, and especially under the heavy Pullman cars. That they should suddenly be found "unfit for the purpose" is startling. But it is hoped that the alert statesmen who happen to see the Berlin dispatch will make some investigations before they introduce bills forbidding the use of paper wheels.

It appears, from an article in the last number of the *Official Guide*, that the rules of the new uniform code were all submitted for literary revision to Mr. J. B. Gilder, of the *New York Critic*, before being finally reported to the Convention. We are glad to know this; it is even better than was anticipated. Notwithstanding the fatherly advice we have ventured to offer on this point nothing was hoped for more refined than a critical review by some ordinary person; one, perhaps, who could tell the difference between "them" and "those" or between "they" and "it." To have a real gilt-edge finish is "too delightful for anything." Seriously, though, we venture to say that the accomplished New Yorker found very few changes necessary. Men with such clear ideas must have had some pretty clear tongues to express them with.

Spring sowing in Minnesota and Dakota is now finished. The condition of the ground was unusually favorable, owing to late and heavy snow. The increase of acreage sowed is probably about five per cent. in Minnesota and 15 per cent. in Dakota, and there is a considerable increase in the acreage of corn, oats and barley.

## Record of New Railroad Construction.

Information of the laying of track on new railroad lines in 1887 is given in the current number of the *Railroad Gazette* as follows:

*Kansas City, Memphis & Birmingham*, from Birmingham westward, 15 miles.

*Midland, of Indiana*, from Eagleton to Lebanon, Ind., hitherto unreported, 15 miles.

*Ohio Valley*, to Marion, Ky., since last reported, 10 miles.

*St. Paul, Minneapolis & Manitoba*, Bottineau Branch, Dakota, 40 miles.

COST PER MILE RUN.		1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
Engineers, firemen and wipers		6.5	6.4	6.0	6.0	6.3	6.4	6.5	6.7
Repairs		3.2	3.9	3.7	4.5	4.5	4.5	3.6	4.1
Waste, oil and tallow		0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2
Fuel		6.1	5.8	5.5	5.5	5.5	5.5	5.6	5.5
Total cost per mile run		16.1	16.4	15.5	16.3	16.6	16.7	15.9	16.5
Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.
1887. 1,047	1883. 1,306	1879. 565	1875. 229						
1886. 751	1882. 2,851	1878. 412	1874. 423						
1885. 404	1881. 1,210	1877. 365	1873. 738						
1884. 803	1880. 1,330	1876. 585	1872. 1,222						

This is a total of 80 miles for the week, making 1,047 miles reported thus far for the current year. The new track reported to the corresponding date for 16 years has been:

This statement covers *main track only*, second or other additional tracks and sidings not being counted.

## NEW PUBLICATIONS.

*The Handling of Railway Supplies; Their Purchase and Disposition*. By Marshall M. Kirkman. Published by the author. 206 pp. and index. Price, 82.50.

Mr. Kirkman's works are well-known to railroad men interested in the practical literature of their calling, and sufficient extracts from the advance proofs of his last book have been published in recent numbers of the *Railroad Gazette* to give an idea of its scope and method. It is the most important and immediately valuable work of this distinguished author.

The current issue of the *The Journal of the Association of Engineering Societies* bears date February-April, three months having been combined in one in order to have the yearly volume end with December, instead of October, as heretofore. The address of the Secretary is now at the office of the *Railroad Gazette*, 73 Broadway. The papers in the February-April number are: "Formulas for Bearing-Power of Piles;" "E. S. Chesbrough—A Memorial;" "Grades and Grade Systems for Cities;" "Future Drainage of St. Louis," and "Efficiency of Cable Roads." The valuable index to current literature is continued.

*The Transactions of the American Society of Civil Engineers* for February contains "Specifications for the Strength of Iron Bridges," with a discussion; "Vibration of Bridges," and "The Water Supply, Drainage and Sewerage of the Lawrenceville School."

## Locomotive Performance.

The following particulars of the performance of the locomotives on the Kansas City, St. Joseph & Council Bluffs are taken from a very full and detailed report for 1886. Three empty cars are rated as equal to two loaded ones, and one pound of tallow is rated as a pint of oil.

It is noticeable that the consumption of fuel per mile has risen (comparing 1879 with 1886), in spite of the fact that the average number of cars hauled per train has decreased. The coal burnt per car-mile has thus apparently increased about 33 per cent., but this is probably due to the increased capacity of the cars. A similar increase is observable in the consumption of oil.

The consumption of nine 14 in. engines almost entirely engaged in passenger service was 44 miles per ton of coal. This seems a heavy consumption for an average train of 3.8 cars, but the engines are somewhat old and not sufficiently powerful for the work.

The locomotives are all of the American type, except those used as switchers, which have four wheels all coupled. The switchers have 15 in. by 22 in. cylinders and 44 in. wheels. All the other engines have 57 in. drivers. The lighter engines are almost entirely employed on passenger service. Nearly all the engines were built at the Manchester Locomotive Works, Manchester, N. H. The following table shows the sizes and weights of the engines:

Dia. of cyl.	Weight on drivers.	Total weight.	No. of locomotives.
12 in.	.....	.....	1
13 in.	.....	.....	
14 in.	35,000 to 38,000	52,000 to 59,000	10
15 in.	49,0	46,000	8
16 in.	40,000 to 46,000	60,000 to 71,000	13
17 in.	45,000 to 52,000	70,000 to 80,000	9
Not stated.	.....	.....	2
Total.	.....	.....	44

During the year 22 engines received light repairs, 9 heavy repairs and 1 engine was rebuilt.

The cost of repairs per mile is certainly very low, but as no less than 33 per cent. of the engines are from 17 to 20 years old, some 14 engines will have to be entirely rebuilt or replaced within the next few years. Reckoning the net cost of each at only \$8,000 this makes a sum of \$112,000, which if spent within the next four years is equal to 1.7 cents per engine mile for renewals and rebuilding in addition to the usual repairs. Hitherto apparently only one engine has been renewed per annum.

The engine mileage for the year 1886 is as under:

Passenger.	624,709
Freight.	562,520
Construction.	70,582
Switching.	386,615

Total. 1,643,326

Two features in the mileage partly account for the low cost of engine service per mile. The large proportion of passenger mileage, which exceeds the freight mileage, a very unusual feature, especially on western roads, tends to reduce the average cost. Switching mileage appears to be reckoned on a liberal basis. No less than nine locomotives have each made over 30,000 miles of switching during the year, the average total mileage of these engines being 35,718 miles per engine. Making a deduction for Sundays, washing out and repairs, a locomotive can hardly be expected to work more than 280 days in a year. At this rate, the average mileage per day of these switching engines would be 127 miles. Supposing the engines were never to stop for meal hours, etc., this at 6 miles per hour mean 21 hours work per day. This seems rather a large allowance for nine engines the whole year through.

The expenses are reduced by the deduction of "auditor's figures," presumably credits for switching and other work done for other railroads. Whether the mileage given includes the mileage run for other companies is not stated, but presuming it does, the following figures show the cost per *train mile* as contrasted with the cost per *engine mile*, illustrating the great variations in the apparent cost produced by slightly different methods of handling the figures:

Per engine mile.	Per train mile.
Cents.	Cents.
Engineers, firemen and wipers	6.7
Repairs	4.1
Waste, oil and tallow	2
Fuel	5.5
Total	16.5

The higher figures, however, still show that the locomotives are worked at a very moderate cost, and reflect great credit on the Master Mechanic, Mr. F. A. Chase.

## The Transcasian Railroad.

The following extract relative to this road is translated from the *Oesterreichischen Centralblatt für Eisenbahnen*:

The chief necessity for building this road is, of course, a military one. Up to the present time Russia's Asiatic possessions, with their vast agricultural and mineral resources, were lying idle for lack of means of transportation, but, with the opening of a direct railway, their inexhaustible resources can be utilized and more fully developed year by year, so that in the future Russia will draw from her own national domain the raw material for the supply of her own industries. Such are silk, copper, wool and cotton, which, instead of being brought laboriously on the backs of camels and horses, can be brought directly, cheaply, and to an unlimited extent, by this overland railway. The districts of Bokhara and Samarkand, for example, are unsurpassed in regard to fertility, and the raising of cotton has already advanced there with rapid strides on account of the facilities with which it can now be brought to market by this railway. The district of Merv is another rich part of that country, and especially noted for its grain production.

The Transcasian Railway has in a remarkable manner solved great technical problems. The roadway passes through vast tracts covered with very fine drift sand, which, when set in motion, becomes extremely troublesome. These sand tracts aggregate a length of 200 English miles, some of them being 20 miles long. Three different methods were tried to overcome this difficulty. Certain sections were covered with saline earth. This proceeding is very simple and the work lasting, as proved by sections between Askabad and Ghiaur, which have remained intact for more than a year. On the section Merv-Oxus, branches of the "saksaul," which grows plentifully there, were planted along the cuts. With the greatest success this system was employed near Utsch-Adji, where the small branches of the saksaul were fastened along the embankment. These works have now existed for six months and suffered no apparent damage. The third method is the planting of hedges which by their roots hold the sand. For this purpose the saksaul, the shrub tamarix polasii, the Russian prairie grass and especially the wild oats are used. For the cultivation of these plants, nurseries have been established and large quantities of grass seeds stored for use in the spring.

The question of water was of no less importance. For the first half of the road water could be procured from the chain of mountains of Kopet and Kuren-Dagh, which runs parallel for a distance of 200 miles. Here the water could be readily

stored in tanks for the use of the locomotives. The same source supplies the pumps at the stations. The section where water is scarce lies between the Merv Oasis and Tchihardjui, and has a length of 120 miles. But even here, fortunately, subterranean springs have been discovered at last.

The third difficulty was the heating of the road buildings, as the winter is extremely cold and no fuel to be found in these regions. For this reason the locomotives of the Transcaspian Railway burn petroleum. The use of petroleum for heating houses has recently been begun.

The length and cost of the line were given in the *Railroad Gazette* of March 4.

In the last two years a branch of 16.6 miles has been built from Michailowsk to Uzun-Adas, on account of the harbor of Michailowsk being too shallow and dangerous for vessels of any size. It was therefore decided to make Uzun-Adas, with its many natural advantages, into a port. Since then Michailowsk has been almost deserted by larger vessels, while the new port grows from day to day.

The Russian government is considering the advisability of establishing a regular line of steamers on the Amoo. This river, which now empties into the Sea of Aral, found its outlet formerly, probably until the 15th century, into the Caspian Sea. It is thought possible to turn it again into its original bed (which is still plainly discernible) at a cost of 27 million roubles. By this course Russia would secure by the Volga, the Caspian Sea and the River Amoo a magnificent waterway from the interior of European Russia to the very heart of Asia.

#### TECHNICAL.

##### Iron and Steel.

The Union Steel Co. of Chicago has shut down its steel and rail mill. Twenty-eight men struck for a trivial cause, and a general shut down followed, locking out 750 men.

The Roane Iron Co. has begun operations in its new steel mill in Chattanooga, Tenn. It is the largest Bessemer steel plant in the South. It starts with a capacity of 200 tons of steel a day and employs 600 men.

The Swindell Construction Co., of Pittsburgh, have closed a contract with the Phoenix Iron Co., of Phoenixville, Pa., for an extensive steel plant, consisting of three 20-ton open-hearth furnaces, two large ingot-heating furnaces and a large battery of gas producers. A 36-in. blooming mill is being built to break down the ingots, and the entire plant will be fitted up with the most improved appliances, hydraulic cranes, etc.

##### Bridge Notes.

Bids are invited for an iron bridge across the Dakota River at Yankton, Dak., until May 18. The length of the bridge will be 150 ft., with a roadway 14 ft. clear, and it is to be completed by Sept. 16, 1887. A draft of plans and specifications should accompany each bid. Address Christian Hage, County Auditor, Yankton, Dak.

The Chicago Forge & Bolt Co., operating the American Bridge Works, has the contract for the Chicago, St. Paul & Kansas City road's bridge of five 180 ft. spans, crossing the Des Moines River at Des Moines, Ia.

##### Manufacturing and Business.

The contract for the construction of seven elevators in the State, War and Navy Department Building, Washington, D. C., has been awarded to the Crane Elevator Co., of Chicago, at their bid of \$17,190.

The Phosphor-Bronze Smelting Co., of Philadelphia, has its new foundry in operation. It is fully equipped for the production of all kinds of phosphor-bronze castings in green and dry sand or loam.

The McLeod Railroad Air Signal Co. is putting in 5 of its signals on a leading New England road for trial. This signal has already been used with satisfactory results on the Old Colony road for several months past.

The National Paint Works of Williamsport, Pa., have lately received several large orders for their "Asphaltum Paints" to go to railroad companies in South America.

Richard Vose, of New York, is now shipping to the Michigan Car Co. 550 sets of his "Graduated Bolster Springs," to be used on 150 live stock and 400 30-ton freight.

##### The Rail Market.

**Steel Rafts.**—Only a few small sales are reported in the East. In the West inquiries amounting to 40,000 to 50,000 tons have been received. The quotation is \$38@\$38.50 at Eastern mills.

**Old Rafts.**—No business of consequence reported. Double heads are offered here in part and for shipment at \$22, and tees \$21.50.

**Scrap.**—Very dull market. Yard scrap, \$22@\$22.50 nominally.

**Rail Fastenings.**—Spikes, 2.45@2.50c.; angle fish bars, 2.15@2.25c.; steel angle bars, 2.25c.; and bolts and nuts, 3.10@3.20c.; bolts and hexagon nuts, 3.25@3.40c.

##### The New Cruiser Baltimore.

The first rivet was driven on the keel of the new cruiser Baltimore at Cramp's ship-yard in Philadelphia, on May 10, by Chief Naval Constructor Wilson and Samuel Cramp.

##### Tin Plate Manufactured in America.

The first sheet of tin plate ever made in this country was successfully manufactured this week at the Hubbard Tinning Co.'s Works in Hubbard, O.

##### Old Rails from Bombay.

A cargo of old iron rails arrived in New York this week from Bombay, the first importation of the kind that has ever come from British India. The cargo is to be sent West, where it is said other shipments from Bombay are expected.

##### Rolling Stock and Supplies for Italy.

It is announced that the Italian Mediterranean Railway is inviting tenders for the supply in different lots of 2,000 freight, platform and baggage cars, 4,000 pairs of wheels, and 2,000 springs of various kinds. A certain preference will be given to the tenders of Italian firms, but American makers are competent to compete through the United States Consul in Milan.

##### Annual Report of the Philadelphia Co.

This company, as is well known, was organized May 24, 1884, for the purpose of acquiring and exploiting natural gas territory in the neighborhood of Pittsburgh. The report of the Board of Directors for 1886, and for three months ending March 31, 1887, is published.

For 1886 the total earnings from gas and oil were \$1,500,161; operating expenses proper, \$355,900; interest, discount commissions and taxes, \$186,276; leaving net earnings, \$957,985, which is 15.87 per cent. on the capital account,

Dec. 31, 1886. Dividends were paid, at the rate of 1 per cent. per month, amounting to \$957,985, and there was left an undivided surplus of \$336,484. The net earnings for the first three months of 1887 were \$319,887, and dividends at the rate of 1 per cent. a month are continued. The undivided profits March 31 amounted to \$857,412. The capital stock paid in up to March 31, 1887, was \$6,836,150, and the total the board is authorized to issue is \$7,500,000.

During the past year no person has been injured, nor has any property been destroyed by the fault of the company, and it is not known that any consumer suffered from a short supply of gas. On May 1, 1887, this company assumed the operation of the lines and property of the Pennsylvania Natural Gas Co. under a 20 years' contract.

##### A Scandinavian Tunnel.

The governments of Sweden and Denmark have under consideration a proposal for the construction of a railway under the Sound, and uniting Scandinavia with the Continent. The proposal, which has been formed by a French engineer, M. Rothe, who, for some time, was engineer to the Panama Canal Co., provides for a tunnel from some spot near Copenhagen to Malmo, on the Swedish coast. The total length is nearly eight miles. Examination of the soil to be bored has shown it to be chalk, similar in character to that between England and France.

##### Mountain Road in Baden.

After mature deliberation the government of Baden has concluded to adopt for the Höhlethalbahn a combined system with Rigggenbach's ladder-rail. Herr Roman Abt, the originator of the Harz rack-railroad, tried unsuccessfully to have his system adopted for this line.

##### The Fastest Boat in the World.

A twin screw torpedo boat built for the Italian government by Yarrow, of Poplar (England), has attained on a trial trip a speed of 24.964 knots, or nearly 29 miles per hour. This is stated to be the greatest speed ever recorded. The boat was fully equipped and the water was somewhat rough. The dimensions are as follows:

Length on water line	140 ft.
Beam extreme	14 ft.
Draft of water	5 ft. 4 in.
Displacement	100 tons
Indicated horse-power	1,400
Average boiler pressure	130
Average revolutions per minute	366

This is the first occasion on which twin screws have been applied to a torpedo boat, and the results are certainly very surprising. If this speed could be maintained across the Atlantic, the passage between Sandy Hook and Queenstown could be made in 4 days 19 hrs. 30 min., a saving of nearly 1½ days on the fastest trip hitherto made.

The feat of building engines of 1,400 indicated horse-power to weigh less than 200 tons would a few years ago have been deemed impossible, but in this boat, engines, coal, hull, fittings, torpedoes, guns, steam steering gear and crew, all told, weigh only 100 tons.

##### Bessemer Pig Output.

The extraordinarily heavy production of pig iron in the United States this year, together with large importations, has drawn the attention of the trade at home and abroad. The home demand for steel for rails and other purposes has been enormous, but it has been only in a general way that those most interested have realized that the home output of Bessemer pig for steel purposes is increasing so rapidly. The total weekly production of Bessemer pig, as ascertained by *Bradstreet's*, was in April, 1887, 55,512 gross tons, and in April, 1886, 40,435 gross tons, while the total reported production of pig-iron of all kinds in the same periods was 137,523 and 104,867. That is, while the weekly output of all kinds of pig increased 31 per cent. in the year, that of Bessemer pig increased 37 per cent. But the outlook is for a further increase of the production of Bessemer. It is estimated that this increase will be, by next autumn, at least 4,000 tons a week, and the outlook, therefore, is for an ultimate check to the heavy receipts of British Bessemer pig iron. *Bradstreet's* adds that "this holds true of English steel rails and unwrought steel quite as much." The importations of pig iron of all varieties during the first three months of 1887 and of 1886 were, in gross tons:

Imports.	1887.	1886.
Pig iron, all kinds, tons.	93,590	74,685
*Sooth foundry pig, tons.	13,000	18,000
Approx. Bessemer pig and spiegel importations	80,590	56,685

\* Estimated.

##### Fall of a Suspension Bridge in Austria.

A suspension bridge fell last September at Mahrisch-Ostrau, while a squadron of cavalry was crossing, causing considerable loss of life. This bridge was built 36 years ago. The accident was caused by the rupture of one of the anchor cables, which had rusted where it came in contact with the masonry. The bridge was 308 ft. long, the central span 214. At the point of rupture the cable had been reduced to one-sixth of its original section; and it is calculated to have been loaded to about 64,000 pounds per square inch.

##### A Costly Fire.

The bridge building works of the Chicago Forge and Bolt Co. were destroyed by fire last week, entailing a loss of something like \$400,000. Among the uncompleted bridges destroyed were 38 for the Chicago, Santa Fe & California road (the new Chicago line of the Atchison, Topeka & Santa Fe), and a new bridge for the St. Paul, Milwaukee & Omaha to be put across the Des Moines River. The loss is partially covered by insurance, and it is thought the company will immediately rebuild the works. About 300 men were thrown out of employment.

##### The Channel Tunnel.

In a paper recently presented to the Academy of Sciences of Paris, by M. Beau de Rochas, renewing the discussion of the project of a tunnel across the British Channel, he concludes that the proper means of accomplishing the end is a tube, arguing that an indispensable condition must be the possibility of destroying the means of communication very quickly and effectually, independently of fortifications at the ends; also that it is impracticable to obstruct navigation by the numerous piers which a bridge would require. A tunnel he considers out of the question, for the reason that the geological changes which cut England off from the Continent are still going on, and the destruction of the roof of the tunnel from the subsidence of the bottom of the channel would be only a question of time. Replying to this, the *Moniteur Industriel* holds that if a tunnel would be destroyed by the geological changes in the bed of the channel, so would a tube, as it could hardly be expected that a tube as a submarine bridge across the channel. As to the gradual lowering of the bottom of the channel would be only a question of time. Replying to this, the *Moniteur Industriel* holds that if a tunnel would be destroyed by the geological changes in the bed of the channel, so would a tube, as it could hardly be expected that a tube as a submarine bridge across the channel. As to the gradual lowering of the bottom of the channel would be only a question of time. Replying to this, the *Moniteur Industriel* holds that if a tunnel would be destroyed by the geological changes in the bed of the channel, so would a tube, as it could hardly be expected that a tube as a submarine bridge across the channel. As to the gradual lowering of the bottom of the channel would be only a question of time. 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persons on the Common, 85 of whom were unmistakably tramps; at a later hour there were 100 persons, 60 of them tramps. This morning he counted 48, fully half of whom were tramps, and most of them looked as though they had been there all night. He thought the objection to tramps was mainly a matter of sentiment. He said the most beautiful sight he saw in Europe was the cars filled with passengers running beneath the trees of Unter den Linden in Berlin. The Boylston street mall, he said, is only a back yard, while along Tremont street is a double mall. He suggested that if the Common was to be preserved to the injury of business, and regardless of public convenience, it better be fenced in and kept sacred for the use of tramps.

#### A Remarkable Record.

The Northwestern Ohio Division of the Pennsylvania Company (Mansfield to Toledo) was opened for business in May, 1873. It is probable that this division has made a record never equaled by any other operated in this country. Notwithstanding the fact that it has had a large passenger traffic for 14 years, not a single passenger has received the slightest injury. But one passenger car has been off the track, and that was caused by a broken rail, and then no one was hurt. There has never been a change of superintendents, and as the employees seldom die, are rarely discharged and never resign, many of those who were with the division when it first opened are still there. There has never been a strike on the division worthy the name. During the great railroad strikes of ten years ago, when there was trouble from one end of the country to the other, the N. W. O. division moved along very serenely, and at peace with all the world.

Mr. J. S. Morris, an old passenger conductor of the main line, was appointed superintendent of the N. W. O. when the road was opened. He has been there ever since, and has now been in the service of the Pennsylvania some 30 years. The four passenger conductors of the N. W. O. have been in the employ of the Pennsylvania from 15 to 26 years.—*Railway Service Gazette*.

#### Income Tax from Enginemen.

The following is from the *People's Budget and Railway Service Gazette* of Allahabad, India:

"S. C. writes: 'Would you kindly answer the question, What constitutes salary? It was answered in Parliament only a few days ago that Income Tax in India was only deducted from salary. On state railways Income Tax is stopped from driver's overtime. It is also done from premium earned in saving fuel. Do you think there is a chance of us regaining this hard earned pice or having it discontinued?' To be candid, we don't."

It is hardly to be wondered at that "S. C." should object to such sharp practice on his income, which must destroy much of the pleasure arising from an increase of pay.

#### Rich Soil

The only stockholder that ever got a dividend out of the old Farmington (Conn.) canal has just died. The president told him that there was no dividend, and no prospect of any, and jestingly advised him to go home and mow the towpath for a dividend. Mr. Munson did so, taking a 20 per cent. dividend in hay from the eight miles of towpath, and went on doing this with perfect complacency thereafter.

#### A Good Crop Year for Strikes.

The worst features of general business at present are the iron trade and the labor troubles, the strikes in May averaging 5,000 men per day. So far this year there have been 376 strikes, or 75 per cent. more than in 1886, the great strike year.—*Bradstreet's*.

#### Not Exactly a Trunk Line.

The Cincinnati, Columbus & Hocking Valley Railroad, from Clayville Junction, on the Little Miami, to Jeffersonville, on the Ohio Southern, twenty-eight miles, is still a bone of contention, and representatives of Phil. Armour made another attempt to take up the rails last week. A similar attempt was made a month ago, but was enjoined by the farmers along the line. The idea is to sell the rails and thus get some money out of the road, which cannot be made by operating it. This is the road which Mr. E. L. Harper gave to the Chicago boys in settlement for a wheat deal he managed a few years ago.

Mr. Harper got the road by furnishing rails for it from his rolling mill. The road boasts of one locomotive not in running order, two passenger cars, excellently fit for tramp roosts, and half a dozen flat cars good enough to haul the rails to Chicago on. The Harper party turned over the road, which had \$500,000 of first mortgage, \$500,000 of income bonds and \$500,000 of stock, to the Chicago speculators for their claims of between \$400,000 and \$500,000, Armour taking the road subsequently as part of the assets of his brokers, McHenry & Co.—*Cinn. Commercial Gazette*.

#### Railroad Legislation in the Dominion.

A bill has been introduced in the Dominion Parliament embodying some of the features of the U. S. Inter-state Commerce law. The most important provision relates to discrimination of rates, and provides that no railroad company shall charge for carrying freight a short distance a greater rate than for carrying the same class of goods a longer distance, in which the shorter is included. The bill further provides that unused passenger tickets may be redeemed at any station or office of a company between and including the points covered by the ticket, and also provides a penalty, recoverable in case of refusal to so redeem any ticket.

#### An Interview with Judge Cooley.

The President of the Inter-state Commission has talked to a reporter this week as follows:

"How did you find the South during your recent visit there?" he was asked.

"Different. Things are getting on differently. Atlanta is a very prosperous place. Mobile is not going ahead. The people of Mobile believe that the railroad discriminations have checked the growth of their city, and doubtless the transportation rates have had much to do all over the South. But I doubt if that could be helped. During the past few years a great change has come over the method of doing business. Margins of profit have become so small that time has become the most important element in shipments. For this reason water competition with railroads has constantly been growing less and less. This change is severely felt in the South, where the cities have been built on navigable streams. Water freights still regulate the railroad charges at competing points; but, as I said, the influence of water communication is constantly decreasing."

"Is this true on the great lakes?"

"The influence of lake competition is still great, but it is not so great as it once was. There is a Detroit sugar merchant (and there are others like him) who complains that the Inter-state Commerce law has ruined his business. New York merchants now sell to interior points in the state and ship direct, leaving Detroit out in the cold."

"Is that result due to the law, or to the general conditions of business?"

"As to that I can only say that changes in business are constantly going on. There was a time when every town in

Michigan had its tannery. Now there are few tanneries in the state. These changes are constantly going on, without any reference to the Inter-state law or any other law."

"Has the question of what constitutes a line of railroad come before the Commission?"

"This much has been decided. The rate from Chicago to Liverpool is the same, whether the freight goes by the way of Boston or New York, yet the rate from Chicago to Boston is and must be greater than from Chicago to New York."

"Then the steamer part of the way counts as part of the line?"

"Yes; for in no other way is exportation possible at Boston. She has not the facilities that New York has."

"Can you say whether, on the whole, the workings of the law have begun to remedy the evils complained of?"

"That would be a matter of opinion. One man would think one way and another would have a different view. My opinion would be only that of one person, and I must decline to give it."

#### General Railroad News.

##### MEETINGS AND ANNOUNCEMENTS.

###### Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

*Chicago, Burlington & Quincy*, annual meeting, at Chicago, May 18.

*Fort Worth & Denver City*, special meeting, Fort Worth, Tex., June 22.

*Flint & Pere Marquette*, annual meeting, East Saginaw, Mich., May 18.

*Puget Sound Construction Co.*, annual meeting, at the office, Seattle, Washington Ter., May 19.

###### Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

*The Master Car-Builders' Club* holds its regular meetings at the rooms, No. 118 Liberty street, New York, on the third Thursday in each month.

*The Master Car-Builders' Association* holds its annual convention at Minneapolis, Minn., June 14.

*The New England Railroad Club* holds its regular meetings at its rooms in the Boston & Albany passenger station in Boston, on the second Wednesday of each month.

*The Western Society of Engineers* holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

###### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

*Chicago and Alton*, \$2 per share, quarterly, payable June 1, to stockholders of record on May 17.

###### Master Car-Builders' Association.

The following circular has been issued by Secretary Forney to the Members of the Master Car-Builders' Association:

In accordance with the action of the Executive Committee a sub-committee, consisting of Messrs. Marden, Packard, Wood, Kirby and Forsyth, has been appointed to revise the Code of Rules Governing the Condition of, and Repair to, Freight Cars for the Interchange of Traffic. All parties having changes to propose in those rules are requested to communicate with Mr. J. W. Marden, Master Car-Builders of the Fitchburg Railroad, Boston, Mass., who is chairman of that committee.

###### PERSONAL.

—E. C. Janes has resigned his position of General Passenger and Freight Agent of the Cleveland, Akron & Columbus.

—J. M. White, for 15 years the President of the Mississippi & Tennessee Railroad Co., died at Memphis, Tenn., on May 5.

—Charles Iverson, Chief Accountant of the South Pacific Coast Railroad Co., died in San Francisco on May 1. He was 55 years old and had been employed by the company for the past 10 years.

—Samuel McD. Tate, of Morgantown, N. C., who was at one time associated with the management of the Memphis & Charleston road, has been appointed Examiner of National Banks in North Carolina and Virginia.

—The First Master Mechanic of the Gotthard Railway, Mr. Jacob Stocker, recently died at Luzerne, Switzerland, at the age of 44. He held the position since 1874. He devoted special attention and study to the perfection of car brakes, especially those used on mountainous roads, and to the problems of locomotive building.

—S. T. Smith, the new General Manager of the Denver & Rio Grande, began his railroad career in Leavenworth, Kan., in 1864, in the Auditor's department of the Kansas Pacific. He continued with that company in various capacities until its consolidation with the Union Pacific. Under the Dillon management he was appointed General Superintendent of the Kansas Pacific and subsequently General Superintendent of the Union Pacific system. He is about 45 years old.

—David H. Moffatt, Jr., who has succeeded W. S. Jackson as President of the Denver & Rio Grande, was born in Osage County, N. Y., in 1839. His life has mostly been passed in the banking business, he having entered a bank in New York when he was 9 years old. In 1855 he went to Des Moines, Ia., and entered the banking house of A. J. Stevens & Co. In the following year he went to Omaha, Neb., and took charge of the Bank of Nebraska as cashier. He remained in this position for 4 years when he went to Denver, Col., and started a book and stationery store. In 1867 Mr. Moffatt was elected Cashier of the First National Bank of Denver, which position he held till 1880, when he was chosen President of the bank. Mr. Moffatt has always been connected with the railroad interests of the state. He is a heavy stockholder in the Denver & South Park and one of the organizers of the Denver Pacific, of which he has been Treasurer and Vice-President. He has been a prime mover in many other railroad projects and has held public office in Colorado.

###### ELECTIONS AND APPOINTMENTS

*Atchison, Topeka & Santa Fe*.—At the annual meeting last week the following directors were elected: B. P. Cheney, Chairman; W. B. Strong, L. T. Burr, C. R. Codman, A. W. Nickerson, Warren Sawyer, George O. Shattuck, Alden Speare, W. F. Wharton, George S. Ealey, C. K. Holliday, E. B. Purcell, L. Severy. The officers are: W. B. Strong, President; C. W. Smith, First Vice-President and Chief Engineer; E. Wilder, Secretary and Treasurer; G. L. Goodwin, Assistant Secretary and Treasurer; J. F. Goddard, General Manager; J. P. Whitehead, Comptroller and General Auditor; H. C. Clements, Auditor. The headquarters of Messrs. Smith, Wilder, Goddard and Clements are at Topeka, Kan.

C. A. Parker has been appointed Assistant General Freight Agent, vice J. O. Phillips, resigned.

George T. Nicholson has been appointed General Passenger and Ticket Agent.

*Burlington, Cedar Rapids & Northern*.—The following have been elected officers of the leased lines of this company, namely, the Cedar Rapids, Iowa Falls & Northwestern, Chicago, Decorah & Minnesota, Cedar Rapids & Clinton, and the Iowa City & Western: C. J. Ives, President and General Manager; J. C. Brocksmith, Vice-President; W. P. Brady, Secretary; S. S. Dorwart, Treasurer; H. F. White, Chief Engineer, with the exception of the Chicago, Decorah & Minnesota, of which H. H. Hollister, of New York, was elected Treasurer, and S. S. Dorwart, of Cedar Rapids, Assistant Treasurer.

*Canadian Pacific*.—At the annual meeting in Montreal on May 11, the following directors were elected: Sir George Stephen, W. C. Van Horn, Sir Donald A. Smith, Richard B. Angus, Edmund B. Osler, Sanford Fleming, George A. Kirkpatrick, R. V. Martinson, Hon. W. L. Scott, George R. Harris, Levi P. Morton and Richard J. Cross.

*Carolina, Knoxville & Western*.—The incorporators of this Tennessee company are: C. Phinizy, Augusta, Ga., President; C. Powell, Knoxville, Vice-President; F. A. Frerson, Secretary, and H. B. Branner, Knoxville, Treasurer.

*Central of Georgia*.—W. P. Savage has been appointed Superintendent to fill the vacancy caused by the death of F. M. Fonda.

*Central of New Jersey*.—At the annual meeting last week the following directors were elected: Austin Corbin, Eliza P. Wilbur, H. C. Fahnestock, J. Rogers Maxwell, Charles Hartshorne, George F. Baker, Robert H. Sayre, Edward D. Adams and Henry Graves.

The directors have elected J. R. Maxwell President. Samuel Knox is re-elected Secretary.

*Chicago, Rock Island & Pacific*.—William J. Leahy has been appointed Traveling Passenger Agent in New York state, with headquarters at Buffalo.

*Cleveland, Akron & Columbus*.—E. C. Janes, General Freight and Passenger Agent, having tendered his resignation, C. O. Wood has been appointed General Passenger Agent, and H. B. Dunham General Freight Agent.

*Cleveland, Lorain & Wheeling*.—At the annual meeting in Cleveland, O., on May 11, the old officers were re-elected.

*Colorado Midland*.—Chas. S. Lee has been appointed General Passenger Agent, with headquarters at Denver, Col.

*Delaware & Hudson Canal*.—At the meeting this week the old board of directors was re-elected as follows: Abel A. Low, James M. Halstead, Le Grand B. Cannon, James R. Taylor, John Jacob Astor, James Roosevelt, Abraham R. Van Nest, David Dow, Robert M. Oliphant, Benjamin H. Bristol, John A. Stewart, Frederick Billings and R. Suydam Grant.

*Detroit, Monroe & Toledo*.—John Newell has been elected President, C. P. Leland Secretary and Treasurer.

*East Tennessee, Virginia & Georgia*.—Peyton Randolph has been appointed Assistant General Manager, with office at Washington, D. C. C. H. Hudson is appointed General Superintendent, with office at Knoxville, Tenn.

*Erie, Butler & Pittsburgh*.—Frederick W. Huidekoper, of Washington, D. C., is the President of this new Pennsylvania company.

*Hannibal & St. Joseph*.—H. C. Orr has been appointed General Southwestern Passenger Agent of this company and of the Kansas City, St. Joseph & Council Bluffs. Office at Kansas City, Mo. I. N. Wilber has been appointed Division Master Mechanic of the Hannibal & St. Joseph, office at Brookfield, Mo.

*Lehigh Valley*.—John B. Garrett has been elected Third Vice-President.

*Louisiana & Missouri River*.—At the annual meeting in St. Louis last week the following directors were elected: Henry Cabot Lodge and Arthur B. Silsbee, Boston, Mass.; John J. Mitchell, W. H. Bliss, R. P. Tansey, Arthur Lee, and Elenius Smith, St. Louis, Mo. The directors elected the following officers: W. H. Bliss, President; R. P. Tansey, Vice-President; Charles H. Foster, Secretary and Treasurer at Chicago; F. A. Wann, Assistant Secretary at St. Louis, Mo.

*Louisville & Nashville*.—H. T. Smith has been appointed Assistant Superintendent of the South and North Alabama division, with office at Birmingham, Ala.

*Minneapolis & St. Louis*.—A. W. Thompson has been appointed Traveling Freight Agent, with headquarters at Minneapolis, Minn.

*New York Railroad Commission*.—The New York Senate has confirmed the nomination of William E. Rogers and Isaac V. Baker as Railroad Commissioners.

*Pittsburgh, Calumet & Newport*.—The incorporators of this Kansas company are: Frank Plater and Frank Lyon, W. D. Ford, Pittsburgh, Kan.; Adam A. McCormick, Parsons, Kan.; E. L. Watson, J. B. Hirsch, Newport, Ark., and C. C. Copeland, Chicago, Ill.

*Richmond & Danville*.—Henry Fink has been elected a Vice-President of this company, and has been placed in charge of the Operating and Traffic Departments. His office will be at No. 10 Wall street, New York City.

*St. Louis, Arkansas & Texas*.—At the annual meeting last week the following directors were elected: S. W. Fordyce, R. C. Kerens, Thos. Randolph, H. G. Allis, J. C. Rieff, C. M. Seeley, G. Clark, Jas. Garrity and Wm. Behan.

J. St. Koslowsky has been appointed Immigration Agent at St. Louis, Mo.

*St. Louis, Fort Scott & Wichita*.—Thomas F. Fisher has been appointed Assistant General Freight Agent.

*St. Louis & San Francisco*.—At the meeting in St. Louis on May 10, directors were elected as follows: Wm. F. Buckley, George Coppell, I. E. Gates, George J. Gould, Bryce Gray, C. P. Huntington, John Paton, Horace Porter, Russell Sage, Jesse Seligman, and Edward F. Winslow, of New York, Walter L. Frost of Boston, and John O'Day of St. Louis. The newly elected directors are George J. Gould, in place of Jay Gould, and John O'Day in place of C. W. Rogers, deceased.

John H. Randall has been appointed Controller.

*Texas Trunk*.—At a stockholders' meeting last week the following officers were elected: President, John L. Henry; Vice-President, J. E. Schneider; Secretary, William M. Gaston; Treasurer and General Manager, William G. Mowery. Directors, W. W. Weigley, F. L. Russ, W. G. Mowry, J. L. Henry, J. E. Schneider, A. Sanger, T. L. Marsalis.

*Toledo, Ann Arbor & North Michigan*.—Henry W. Ashley has been elected Second Vice-President and General Manager.

**Union Pacific.**—W. H. Baldwin, Jr., has been appointed Division Freight Agent and General Passenger Agent in Montana, vice C. W. Scott, resigned.

**Vincennes & New Albany.**—The following are the directors: Emil Waltman, Eugene F. Fuller, Clarence Delafield, Nathaniel P. Hobart, of New York City; Edward Watson, Nathaniel F. Dalton, W. B. Chadwick, John Hack, Eugene Hack, of Vincennes; Amos Stout, of Paoli; W. N. Steele, of Greenville; James S. McCoy, of Monroe City; and N. T. DePauw, of New Albany, Ind. The officers are: Edward Watson, President; Nathaniel Hobart, Vice-President; N. F. Dalton, Secretary; and Emil Waltman, Treasurer.

**Wilmington & Northern.**—At the annual meeting last week the old directors and officers were re-elected without opposition.

#### OLD AND NEW ROADS.

**Addison & North Pennsylvania.**—This narrow gauge road was sold last week, at Bath, N. Y., for \$135,000. The line is from Addison, N. Y., to Galeton, Pa., 46 miles. It originally cost \$475,000. It is stated that it was purchased for the Delaware, Lackawanna & Western.

**Atchison, Topeka & Santa Fe.**—The company is building from Pueblo, Col., a road parallel to the Denver & Rio Grande, and will soon have a line of its own into Denver. The company has bought the Denver Circle road, running into the suburbs of Denver, for \$400,000 cash and \$400,000 in Atlantic & Pacific 4 per cent. bonds, which the Atchison Co. had among its treasury assets. The present entrance of the Atchison into Denver is by a third rail on the Denver & Rio Grande.

**Atlantic, Birmingham & Western.**—At a meeting held in La Grange, Ga., this week, the citizens voted a road-bed and right of way to the company from La Grange to Chipley, 18 miles in Harris County. Troup County also voted \$80,000 to the enterprise.

**Atlantic & Danville.**—This company, which has been extending its line from Belfield to Danville, Va., 125 miles, has failed to meet April interest on its first mortgage bonds, and work on the extension has been stopped. There has been a conference of parties interested with the view of applying to the Court for the appointment of a receiver.

**Baltimore & Ohio.**—The company has its connections across the lower portion of Philadelphia completed and they will be in operation this week. It is intended to establish a bonded iron yard on the Delaware River, and another freight yard with 14 tracks has been located on the Schuylkill River.

It is said that the Messrs. Ives and Staynor are still negotiating for the control of this property. They, with Christopher Meyer and Henry Villard, have been in consultation with President Garrett during the past week.

**Bocco Grande.**—Incorporated at Liverpool, Fla., to build a road about 50 miles long.

**Boston & Albany.**—A number of additional electric track circuit block signals of the Union system are being put in between Springfield and Pittsfield, Mass.

**Boston, Concord & Montreal.**—The Supreme Court opened at Plymouth, N. H., on May 10. The case of this company against the Boston & Lowell is the most important one on the docket. The former company petitions for an injunction to prevent the Boston & Lowell from operating the Boston, Concord & Montreal, and asks that a Receiver be appointed for the latter line. An early decision is expected.

**Boston & Maine.**—The contract for the new Union passenger station at Portland, Me., has been let to James Cunningham, of Portland. The structure is expected to cost \$200,000.

**Boston & Providence.**—There are several rumors being circulated to the effect that this road is to change hands, some large blocks of stock having been bought mysteriously. The most plausible of these is that the Old Colony will gain possession. By so doing, the latter company would have its own connection with Boston for its Northern division, though not a very direct one, without building some new road. It now gives the business to the Boston & Albany at South Framingham.

**Brainerd & Northwestern.**—The line is surveyed from Brainerd, Crow Wing County, Minn., to St. Paul, all but about 50 miles. The line runs east of the Northern Pacific. Going northwest from Brainerd it passes Leech Lake into the Red River Valley. Grading will begin this month.

**Brooklyn Elevated.**—The formal consolidation of the Brooklyn and the Union Elevated Railroad companies is being perfected. The Union line will first be built in Myrtle, Hudson and Flatbush avenues to the Long Island station.

**Cairo Short Line.**—The line will be extended from Marion, Ill., to Creal Springs this summer and then on to Paducah, Ky., where it will connect with the Chesapeake & Ohio.

**California & Oregon.**—The road is completed to Hornbrook, a station 2 miles north of the Klamath River in Siskiyou County, Cal., only a few miles from the Oregon line. By the new time table on this road the time required to go from San Francisco to Portland, Oregon, is reduced to 40 hours.

**Canadian Pacific.**—Officers of this company have petitioned the Dominion Government for power to build a line from Woodstock, Ont., to the Niagara River, to be known as the Niagara & Woodstock.

**Carolina, Knoxville & Western.**—Organized in Tennessee to build a road from Port Royal, S. C., via Augusta, Ga., to Knoxville, Tenn., over 300 miles.

**Catherines & Niagara Central.**—The contract for the construction of this road from Thorold to Hamilton, Ont., has been awarded to Shields & Carroll, of Toronto and St. Catherines, Ont.

**Central Iowa.**—The first-mortgage bondholders' meeting, held in Boston on May 11, adjourned without any action except the appointment of a committee to investigate and prepare some plan for protection. Elijah Smith, Mr. Richardson, of Richardson, Hill & Co., of Boston; Isaac Pratt, Jr., and two or three others constitute the committee.

**Central of New Jersey.**—At the meeting of the new board of directors this week no business was done except the election of the President and Secretary. The meeting was adjourned for two weeks, when, it is thought, a plan of reorganization will be practically completed. This plan, it has been officially stated, will be one to satisfy all the interested companies, the Pennsylvania, the Philadelphia & Reading and the Lehigh Valley.

**Chattarol.**—This road was sold at Covington, Ky., on May 4. George C. Wood, representing the purchasing com-

mittee of the bondholders, bought it for \$780,000. The road runs from Richardson to Ashland, Ky., 50 miles. It is understood that it is to become a link in the Charleston, Cincinnati & Chicago.

**Chesapeake & Ohio Canal.**—A severe break has occurred in the canal at Little Monocacy, Md., about 15 miles from Frederick. It is 80 ft. long and 15 or 20 ft. below the bed of the canal. President Baughman at once put a large force of repairers at work, and it is expected that navigation can be resumed in about ten days.

**Chicago, Burlington & Quincy.**—The Iowa Railroad Commissioners have rendered a decision in the case of Governor Larabee against this company. The trouble arose on the railroad's charge of \$1.80 a ton for hauling coal from Cleveland, La., to Glenwood, La., 128 miles, while the charge from Cleveland to Council Bluffs, 21 miles further, was only \$1.25 per ton. Upon discovering this fact, Gov. Larabee referred the case to the Commissioners. They recommended that the rates be changed so that the short haul charge should be less than the long haul. Then the railroad raised the former long haul charge to \$1.98 a ton, keeping the short haul charge at the old figure. Governor Larabee wouldn't have this, and called the Commissioners together again, and told them to fix a rate which should be fair and reasonable, and then the railroad would be compelled to abide by it.

The Commissioners, having studied the case, have fixed a scale of rates on coal which all roads in class "A" in Iowa must observe. This places the rate from Cleveland to Glenwood, 136 miles, at \$1.45 per ton instead of \$1.98, the rate set by the railroad company. This is arranged on the basis that a proper terminal charge should be 30 cents per ton, that a reasonable rate in addition for any distance up to 100 miles should be 9 mills a ton per mile; for distances between 100 and 200 miles, 7 mills a ton per mile; for distances between 200 and 300 miles, 6 mills a ton per mile; for distances between 300 and 400 miles, 5 mills a ton per mile; for distances between 400 and 500 miles, 4 mills a ton per mile.

Contracts have been let to the following firms for new construction on this road. To Kilpatrick Bros., Beatrice, Mo., from Curtis, Neb., to Cheyenne, Wyo.; Mallory & Cushing, Omaha, Neb., 250 miles northwest of Central City, Neb.; John Fitzgerald, Lincoln, Neb., from Orleans, Neb., to Wano, Kan.; Richardson & Doty, Hastings, Neb., from Culbertson, Neb., 50 miles, northwest; Mallory & Cushing also have a contract for building 75 miles of road from the present terminus of the extension northwest of Grand Island, Neb.

**Chicago & Grand Trunk.**—A survey is being made for a new line which will leave the road at Vicksburg, Mich., and run via Parkdale, Three Rivers and Constantine to Mishawaka, Ind., where it again strikes the present line. It will shorten the distance between Vicksburg and Mishawaka by 14 miles.

**Chicago, Kansas & Nebraska.**—The company is to establish large machine shops in Harrington, Neb. A branch road is to be built into Hastings, Neb., a line having been recently surveyed from Gilead, a point 14 miles west of Fairbury.

**Chicago, Madison & Northern.**—Ryan & McDonald have the contract for building the line from Fox River west to Freeport, Ill. W. G. Darwin & Co. have the contract for 18 miles east from Fox River to Elmhurst, Ill. The company is building the foundations of the Fox River bridge, and the superstructure, built by the Union Bridge Company, is now on the ground. It has 8 spans of 90 ft. each.

**Chicago, Milwaukee & St. Paul.**—It is reported that this company has bought 1,200 ft. of water front property at Seattle, W. T., presumably for terminal facilities.

The company is to build a station in Kansas City, Mo., to cost \$150,000.

**Chicago, Rock Island & Pacific.**—The company has 80 miles of its Wichita extension completed in Kansas. On May 15 it will open for business between Topeka and Harrington. At this point the lines diverge, one going through the city of Wichita and the Indian Territory to Texas, the other in a southwesterly direction.

A gang of thieves that has been engaged in robbing the freight cars of this road for some months past has just been captured by the company's detectives. Lake, Ill., just out from Chicago, was the scene of depredation, and on April 19, last, the plunderers would have been arrested while engaged in their work, but the officers were separated from them by a moving train.

**Chicago & Northwestern.**—This company is not extending its lines to the Pacific coast as has been reported. The company's Wyoming Central line was mostly graded for 51 miles west of Fort Fetterman, Wyo., last year, but the work of laying track was deferred until recently, when completion of the extension was renewed. Further than this the Chicago & Northwestern has no projects for the future in that region.

**Cincinnati & Southeastern.**—The road was sold in Covington, Ky., on May 7. Henry F. Huntington bought it for \$1,000. The road has 18 miles completed, but the franchise covers 225 miles. Its indebtedness amounts to over \$300,000.

**Cleveland & Canton.**—The Blood party having bought all preferred stock held by the Corbin-Parlin people, it now has full control of the road. The present narrow gauge equipment is to be disposed of as fast as it can be at satisfactory rates. There are 1,000 cars. The road has 161 miles of track, with 450,700 ties. Only each fourth tie needs to be replaced with a standard tie in order to change the gauge. This is to be done this year.

**Columbus & Maysville.**—Incorporated in Ohio. The new company is to complete the old Columbus & Maysville road, of which only a small portion was built between Hillsborough and Sardinia, O. The road will extend from Columbus to Aberdeen, a point opposite Maysville, Ky., about 100 miles. A bridge will be built across the Ohio at this point, and connection made with the Kentucky Central road.

**Conneaut, Jamestown & Southwestern.**—Articles of incorporation have been filed in Ohio. Capital \$200,000.

**Current River.**—Work has begun on this road from Willow Springs, Mo. The first 20 miles has been contracted for. The road is to run to a point opposite Cairo, Ill., on the Mississippi River.

**Danville, Tuscola & St. Louis.**—This road, now in course of construction, is completed to Tuscola, Ill. It will go from there to Sullivan. It has been decided to organize a company and construct a road from Shelbyville to Sullivan, thereby insuring this new line to pass via Shelbyville to St. Louis.

**Delaware, Lackawanna & Western.**—President Sloan and Mayor Haynes, of Newark, N. J., have signed the compromise agreement adopted by a conference of representatives of the railroad and the city, in settlement of long-standing differences. All litigation between the city and the company has been ended.

**Denver & Rio Grande.**—It is reported that the company has let a contract for an extension from Glenwood Springs to Aspen, Col., about 38 miles.

**Denver, South Park & Pacific.**—The bondholders have voted to apply for a receiver, and to press foreclosure proceedings. The road is operated by the Union Pacific and extends from Denver to Nathrop, Col., with several branches, a total length of 322 miles.

**Denver, Lansing & Northern.**—Contracts were let on May 13, for the new line from Lansing to Grand Rapids, Mich., about 60 miles. It is intended to have the road completed by next November.

**Duluth, South Shore & Atlantic.**—This company, which absorbs the Detroit, Mackinac & Marquette and the Marquette, Houghton & Ontonagon roads, is building from St. Ignace to Sault Ste. Marie, Mich., about 60 miles, and also westward from Three Lakes to Duluth, Minn. This work is under contract to be finished by next November.

**Erie, Butler & Pittsburgh.**—Charter granted in Pennsylvania. The company proposes to build a road 65 miles in length from a point at or near Erie to a point at or near Greenville, in Mercer County. Capital, \$1,500,000.

**Fitchburg.**—It is reported that this company will furnish the capital to construct and equip a new road from North Adams to Pittsfield, Mass., on the Boston & Albany, about 20 miles. There are several manufacturing villages on the line, and the North Adams branch of the Boston & Albany now has a monopoly of the business.

It is rumored that the company has arranged for the purchase of the Cheshire road, extending from Ashburnham, Mass., to Bellows Falls, Vt., 54 miles.

**Florida Railway & Navigation.**—It is rumored in Florida that this company's system has been purchased by the Richmond Terminal Co.

**Forest City & Watertown.**—It is said that work is to begin on this Dakota road, and that it is to be finished next fall. The length of the proposed line is 56 miles. It will run from Forest City to Bowdle.

**Hartford & Harlem.**—The Railroad Committee of the Connecticut legislature has reported a substitute bill extending the time for completing this road, and for taking lands therefor to three years from the passage of the act, provided that at least \$500,000 shall be expended before 1889 in actual construction in the state.

**Illinois Central.**—Judge Tuley, of the Criminal Court of Chicago, has ordered that a summons be issued against this company calling upon it to show by what authority it claims to own the submerged lands in Lake Michigan in front of the city, and to show cause why it builds docks, wharves, etc., there and leases them.

**Intercolonial.**—The 24-hour system has been officially adopted on this road.

**Kansas, Arkansas Valley & Fort Smith.**—On May 9 work began on an 87-mile section of this road between Wagner, I. T., on the line of the Missouri, Kansas & Texas to Van Buren, Ark. It is expected that the road will be in operation by November.

**Kentucky & Great Eastern.**—This road was sold in Covington, Ky., on May 7. It runs from Maysville to Newport, Ky. It consists mainly of a franchise and nearly \$1,000,000 indebtedness. It was bought for \$500.

**Kings County Elevated.**—The location of this road has been settled upon by the Brooklyn (N. Y.) city authorities. It is to run to the river's edge on the south side of the Fulton ferry house and there will be a covered passage way from the bridge station to the elevated station at Fulton and Sands streets. The foundations for the superstructure have been nearly all laid from Boerum place to Grand avenue. It is expected that the work of putting up the superstructure will begin next week and will go forward at the rate of two blocks a day. A contract is being prepared with Pulliman's Palace Ca' Co. for 100 cars. It is hoped to have the road in operation by July.

**Lancaster & Hamden.**—The survey for this Ohio road has been commenced, and work on the roadbed will be started this month. From Lancaster to Hamden is about 40 miles. The contract for construction will be let soon.

**Mexican Central.**—It is said that work upon the Tampico branch, which has been suspended since 1884, was resumed this week. The last annual report emphasized the necessity of completing the Tampico division, at present separated by a gap of 300 miles from the main line.

**Mexican National.**—L. H. Meyers, Trustee of the Mexican National Railway mortgage, and C. C. Beaman, attorney for that company, and Ex. Norton left on Monday evening last for the City of Mexico to foreclose, buy, and reorganize this road.

**Midland of Indiana.**—The line was opened for traffic on May 2, to Lebanon, Ind., 44 miles west from Anderson and it is to be extended further to New Ross, Ladoga and Waveland.

**Milwaukee, Lake Shore & Western.**—The road has just completed, in connection with the Chicago & Northwestern, the delivery at Chicago of 100,000 tons of iron ore. A second ore dock for the company has just been finished at Ashland, Wis., with a capacity of 27,000 tons, giving it a total storing room of 50,000 tons.

**Mineral.**—The bill granting a charter to the Mineral Railroad Co. has passed both houses of the Virginia legislature. The road is to extend from Strasburgh, Va., to Moorefield, W. Va., about 30 miles.

**Missouri Pacific.**—A piece of ground has been purchased on the corner of Seventh and Chestnut streets, in St. Louis, and on it is to be built a large building to be used as the headquarters of the Missouri Pacific system.

**Newport & King's Valley.**—Incorporated in Oregon. The company proposes to build a narrow-gauge road from Newport, Yaquina Bay, across Siletz reservation and the coast range to Willamette Valley. Capital stock, \$500,000.

**New Roads.**—George W. Gilmer, of Morgansville, Ala., is sole projector, engineer, stockholder and President of a standard gauge road now being built from Cloverfield station, in Lowndes County, Ala. If the venture pays Mr. Gilmer will run branches to Haynesville and Lowndesborough.

The citizens of El Dorado County, Cal., are to build a road from Placeville to Shingle Springs, 12 miles.

A surveying party is locating a new line from Sioux City, Ia., north to Marshall, Minn. It is not known what company is behind the movement.

A company has been formed in the state of Oaxaca, Mexico, to build a road from the City of Oaxaca to Huatulco.

It is said that a scheme is in contemplation for the construction of a line 180 miles long from El Paso, Tex., north to

White Oaks and thence northeast 350 miles from El Paso, where it will meet the extending lines of the Atchison, Topeka & Santa Fe.

Work is to begin immediately on a road from Redding to Fall River Mills, in Shasta County, Cal., a distance of 60 miles.

**New York, Chicago & St. Louis.**—A judgment of foreclosure has been rendered in favor of H. B. Hollins against this company and W. K. Vanderbilt for \$281,667. The property, which is to be sold by the sheriff at Fort Wayne, Ind., is the bed of the old Wabash & Erie Canal from the Ohio state line to Lagro, Ind., 33 miles, except 5 miles of it which constitutes the right of way of the New York, Chicago & St. Louis road through Fort Wayne.

**Ohio Valley.**—On the Princeton, Ky., extension of the road track is completed to Marion. A barbecue was held in Evansville, Ind., on May 7, to celebrate the event.

**Pacific.**—The Pacific Railroad Commission continued its session in New York this week and last. Artemas H. Holmes, counsel for the Kansas Pacific, concluded his testimony, after which Judge John F. Dillon, Sidney Dillon, James H. Ham, Almon Goodwin, Albert S. Rosenbaum, E. A. Andrews, William Bond, George R. Arents, and Amos H. Calef were put on the stand in the order named.

**Pacific State Line.**—Articles of incorporation filed in Colorado. The line will run from Pueblo eastward to a point on the eastern line of the state between the Atchison, Topeka & Santa Fe and Union Pacific roads, where it will connect with the Missouri Pacific, now building west from Ness City, Kan.

**Pennsylvania.**—It is reported that this company contemplates the extension of the North and West branch from Wilkesbarre its present northern terminus to Scranton and Carbondale, thus forming a net work of road from one end of the anthracite coal region to the other.

At the meeting of the directors in Philadelphia, on May 11, the following resolution was adopted:

*Resolved.* That for the purpose of providing the necessary capital for construction and equipment expenditures during the year 1887, on the main and lead lines and branches, and for the completion and extension of new and auxiliary lines—the cost of which is estimated as follows: Construction of third and fourth tracks and additional facilities on the Pennsylvania road, branches and leased lines, \$4,000,000; real estate, Pennsylvania road branches and leased lines, \$700,000; locomotive engines and passenger equipment, \$1,300,000; construction of branch and auxiliary lines, in addition to those now in operation, \$2,000,000; total, \$8,000,000—the privilege be given to the shareholders of the company of subscribing at par, between the 15th and 30th days of June, 1887, on which latter date the privilege will cease, for 8 per cent. of their respective holdings as they stand registered on June 1, 1887. Instant, shareholders entitled to a fraction of a share may subscribe for a full share. The privilege of subscribing may be sold by any shareholder, and blank forms for such purpose will be furnished on application to the treasurer. Payments may be made in full prior to July 1, 1887, or one-half shall be paid prior to July 1, 1887, and the remaining one-half shall be paid prior to Sept. 1, 1887, and in either case receipts will be given bearing interest at the rate of 4 per cent. per annum from date of payment until Nov. 1, 1887, at which time said receipts will cease to bear interest. On and after Nov. 1, 1887, certificates for the new stock will be delivered on surrender of the receipts.

**Pittsburgh, Calamine & Newport.**—Incorporated in Kansas. The proposed road will extend from Pittsburgh, Kan., to Calamine, Ark., and thence to Newport, Ark.

**Pittsburgh, Cincinnati & St. Louis.**—The second brakeman tried for robbery was convicted on May 11. Another brakeman entered a plea of guilty and was remanded for sentence.

**Richmond & Danville.**—The company assumed control of the East Tennessee, Virginia & Georgia road on May 4.

**St. Joseph & Grand Island.**—Bids are requested for grading, bridging and fencing 100 miles of this company's extension in Nebraska, west from Fairfield. Address D. D. Streeter & Co., Fairfield, Neb., or Denver, Col.

**St. Louis & San Francisco.**—Judge Donohue, of New York, decided last week the motion to punish the officers of this company for contempt of court, in failing to appear when required to do so. As the defendants have declared that no disrespect was intended and have allowed the fullest examination of the books, the Court only required them to pay the expenses of the proceedings, amounting to about \$5,000.

**St. Paul, Minneapolis & Manitoba.**—Tracklaying was completed last week on the Bottineau branch of this road, between Rugby and Bottineau, 40 miles.

**Sheffield & Alabama.**—Bids are invited for grading 10 to 30 miles of road. Address P. Campbell, Superintendent, Sheffield, Ala.

**Somerset.**—This company is to be reorganized on May 17. The road runs from Oakland to North Anson, Me., 25 miles. At the meeting next week the question of extending the line to Bingham, 17 miles, will be considered.

**Southern Oregon.**—The Oregon Southern Improvement Co. is reorganizing under the above name. Its charter will enable it to build railroads and run steamships. The company now has a steamship which is run along the Pacific coast. The old company was capitalized for \$3,000,000 stock and bonds. The mortgage has been foreclosed, and the property will soon be sold to the new company, which starts out with one-half the amount of the old capital stock and with no bonds, the old stock being wiped out and the bonds converted into new stock. In two or three months it is expected that the company will again be engaged in its lumber trade, with improved prospects.

**Spokane & Palouse.**—E. M. Wilson, of Spokane Falls, Washington Territory, will have charge of the extension of this road from Belmont to Genesee, W. T., 65 miles. Nelson Bennett is the contractor.

**Texas, Santa Fe & Northern.**—Arrangements are making for the extension of this road from Santa Fe, N. M., down to Albuquerque through the Cerillos mining regions. From Santa Fe to Albuquerque is about 60 miles.

**Utah & Midland.**—The Secretary of the Interior has given authority for the survey of this road through the Uintah Indian reservation in Utah.

**Vincennes & New Albany.**—Under this name the Vincennes & Ohio River and the Vincennes & New Albany companies have been consolidated. A contract for building the entire line from Vincennes to New Albany, Ind., via Jasper, about 100 miles, has been given to Samuel R. Bullock and William Mercer of New York. Work is to begin at once, and it is expected the road will be completed to Jasper by Jan. 1 next and to New Albany by next May.

**Wabash.**—From May 15 the through sleepers of this road to New York will go over the Canada Southern Division of the Michigan Central from Toledo, O., to Buffalo,

N. Y., and from there over the West Shore instead of by the Lake Shore & Michigan Southern and New York Central & Hudson River roads, as heretofore.

The Court has directed Receiver McNulta to pay on June 1 interest, amounting to \$78,000, on two coupons of the first mortgages of the company.

#### TRAFFIC AND EARNINGS.

##### The Inter-state Commission.

The New York Central & Hudson River by Chauncey M. Depew; the Lake Shore & Michigan Southern John Newell, and the Pittsburgh & Lake Erie by John Newell, have petitioned the Commission for an order permitting them and the New York, Pennsylvania & Ohio and the New York, Lake Erie & Western companies to make such passenger and freight rates from points upon the lines operated by the Pittsburgh & Lake Erie to New York, Boston, Eastern Pennsylvania and New England points as will be as low as those charged by the Pennsylvania between the same points, and in the particulars named that they be relieved from the 4th section of the Inter-state law.

The Commission has had the problem submitted to it whether Southern railroads can discriminate against color, and force colored people who pay first-class fare to ride on separate cars.

Anthracite coal shippers have organized an opposition to the advanced tariffs of the coal-carrying roads, and will ask the Commission that the rates on anthracite be reduced to a comparative level with the rates on other articles.

##### Evasion of the Law.

The Louisville, Evansville & St. Louis will be defendant in a suit charging discrimination and the breaking of the Inter-state law. The company contracted to take several hundred cars of corn from East St. Louis to Seaboard points. It is now alleged that the through billing was a fraud, and that the corn was really for distilleries at Louisville, Ky. It is also alleged that the company engaged to deliver it at destination at a less rate per ton than its own published schedule of tolls. The plan was to bill the corn from East St. Louis to Atlantic Coast points, stop it en route at Louisville, taking only the percentage of the through rate for the haul, instead of the tariff to Louisville proper. The Louisville rate is 12 cents a hundred, and the proportion of the through grain rate belonging to roads between Louisville and East St. Louis is 8 cents. It is said that two charges will be filed against the Traffic Manager in the Federal courts—one for false billing, which discriminated in favor of this particular lot of corn, and the other for lowering the rate from East St. Louis to Louisville for the benefit of certain individuals, and then advancing it to the former tariff without giving the public notice of such purpose, required by the Inter-state Commerce law.

##### Work of the Central Traffic Association.

The General Passenger Agents of the Central Traffic Association have agreed to make a rate of one and one-third fare on the certificate plan for any regularly organized association of 50 or more persons. It was also agreed to charge 2 cents per mile each way for parties of 10 or more, tickets limited to go and return within five days. This is virtually the old rate which most of the lines in the Central Traffic Association have given for years previous to the passage of the Inter-state law.

##### The Canals will Profit.

The coal tonnage of the Pennsylvania road for the week, ending April 30 was as follows:

Line of road	Coal.	Coke.	Total.	1886.
18,889	85,712	274,601	185,442	
From other lines	89,571	1,790	91,370	86,523
Total.	278,460	87,511	365,971	271,065
Year to date	4,369,223	1,495,036	5,861,259	4,675,200

Increase for the week, 94,006 tons, or 34.5 per cent.; increase for the year, 1,189,059, or 25.4 per cent.

##### Coal.

Coal tonnages for the week ending May 7 are reported as follows:

	1887.	1886.	Inc. or Dec.	P. c.
Anthracite	647,841	604,563	I. 43,278	7.1
Bituminous	287,291	166,184	I. 121,097	72.8
Coke (April 30)	87,511	70,733	I. 16,778	23.7

Cumberland coal shipments for the week ending May 7 were 43,174 tons, and for the year to date 1,062,374 tons, an increase of 686,676 tons as compared with corresponding period last year.

##### Cotton.

Cotton movement for the week ending May 6 is reported as below, in bales:

Interior markets	1887.	1886.	Inc. or Dec.	P. c.
Receipts	7,568	22,041	D. 14,473	65.0
Shipments	18,265	43,057	D. 24,703	57.5
Stock	86,506	221,127	D. 134,621	60.8

Receipts	13,077	30,150	D. 26,073	66.5
Exports	19,175	88,838	D. 69,663	78.5
Stock	412,570	655,303	D. 242,727	37.4

Total movement from plantations for the crop year ending May 6 was 6,255,476 bales, against 6,304,738 last year, 5,559,981 in 1884-85, and 5,571,781 in 1883-84.

##### Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

Month of April:	1887.	1886.	Inc. or Dec.	P. c.
Huff. R. & Pitts.	\$171,504	\$100,746	I. \$70,758	70.2
Canadian Pac.	449,000	\$83,000	I. 16,000	1.9
Cairo, V. C.	52,054	46,713	I. 5,341	11.4
Chi. & East. Ill.	151,713	144,714	I. 6,096	4.8
C. I. St. L. & C.	197,543	193,831	I. 3,712	1.8
Cin. W. & Balt.	142,836	142,077	I. 759	.5
Col. H. V. & Tol.	228,002	172,366	I. 55,633	82.2
Det. Lan. & No.	89,405	98,339	I. 8,534	8.6
Ed. Ten. Va. & G.	348,753	272,354	I. 76,398	28.0
Ft. W. & Dem. O.	51,647	33,692	I. 17,955	53.2
Houston & T. O.	145,356	169,495	D. 24,133	14.2
Ind. Bloom. & W.	178,707	174,474	I. 4,233	2.4
Lake Erie & W.	139,080	116,458	I. 22,632	19.4
Louisv. & Nash.	1,161,095	960,277	I. 191,818	19.7
Lou. N. A. & C.	160,186	134,707	I. 25,479	18.9
Mobile & Ohio.	150,385	149,772	I. 613	.4
Mil. & Northern.	74,914	53,825	I. 21,088	39.1
Norfolk & West.	307,842	248,297	I. 59,585	23.8
N. Y. City & No.	41,159	38,745	I. 2,414	6.2
Ohio & Miss.	266,268	270,198	I. 10,970	7.0
Ohio Southern.	45,090	34,148	I. 11,072	32.5
St. L. A. & Tex.	141,782	88,203	I. 53,589	60.7
Staten Is. R. T.	52,052	50,124	I. 1,961	3.9
St. Jo. & G. L.	77,942	89,704	I. 11,762	13.1
St. P. & Duluth.	96,740	98,958	D. 2,218	2.2
St. P. & M. Man.	686,657	610,750	I. 66,901	11.3
T. A. A. & N. M.	35,917	23,190	I. 10,747	42.5
Tol. & Ohio Cen.	72,054	56,834	I. 15,250	20.8
Wabash (West).	443,70	450,662	I. 7,192	15.9
Wheeling & L. E.	63,169	43,381	I. 18,723	45.4
Wisconsin Cent.	172,960	139,475	I. 34,480	24.8

Total	\$6,818,065	\$6,065,318	I. \$763,347	12.7
Total (gross)	\$13,310,574	\$10,604,348	I. \$2,706,226	25.5
Total (net)	5,308,030	3,440,299	I. 1,867,731	34.2

#### Month of March:

	1887.	1886.	Inc. or Dec.	P. c.
Canadian Pac.	\$719,255	\$635,765	I. \$83,490	13.1
Net earnings	51,934	134,205	D. 82,271	21.9
Che. & Ohio	355,496	338,154	I. 17,342	5.1
Net earnings	120,541	116,927	I. 3,614	

**Failures Due to the New Law.**

Two barbed wire fence manufacturers of Chicago failed on May 10. Sherman & Marsh and Schnabel & Co. are the names of the firms, and they assert that the immediate cause of the failures was owing to the operation of the Inter-state law. The act abolished rebates on heavy shipments, which enabled other firms shipping by water to sell cheaper, and as a result business dropped off entirely.

**Canadian Pacific Competition.**

The representatives of the transcontinental lines were compelled to adjourn their meeting in Chicago this week without reaching any agreement with the Canadian Pacific and the Pacific Mail as to differential rates.

**An Ore Pool Dissolves.**

The ore pool which was formed by the different railroads entering Pittsburgh to control the shipment of ores from the coke districts has been dissolved. It is not believed, however, that there will be any cutting of rates, as all the blast furnaces have made extensive contracts and all the railroads will have as much of this class of freight as they can handle.

**Reducing Rates.**

The Inter-state Commission having decided not to suspend the 4th section of the law for the benefit of the Northwestern roads, the managers of those roads have agreed upon a reduction of the present East and West through traffic tariff of 2 to 5 cents per 100 pounds. This had to be done in order to meet Lake Superior competition.

**An Express War.**

The Southern and the Baltimore & Ohio express companies are engaged in a war of rates from Chattanooga, Tenn. A few days ago the Southern cut the Cincinnati rate 35 per cent., and the Baltimore & Ohio cut the Eastern rate to Philadelphia and New York to \$1.50, the former rate being to New York \$2.25 and to Philadelphia \$2. It is expected that the cutting will be applied to the rates to New Orleans, and all points reached by the two companies.

**The Commission Wrangle.**

The New York, Ontario & Western has gone into the trunk line agreement about commission paying. The road is allowed differentials. It is allowed to charge \$3 less than the Chicago rates of the Pennsylvania and New York Central & Hudson River, \$1.50 less than those of the West Shore, the Delaware, Lackawanna & Western, and the New York, Lake Erie & Western, and \$8 more than its own present tariff and that of the Baltimore & Ohio. The arrangement is put down to last only 15 days. It makes the three grades of Chicago first-class fares, \$20, \$18.50 and \$17.

The deadlock between the Eastern and Western lines continues. The Chicago & Alton, Chicago, Rock Island & Pacific, Wisconsin Central, Missouri Pacific and the Atchison, Topeka & Santa Fe are among the Western lines which still stand out against the agreement.

**Transcontinental Traffic.**

The representatives of the lines interested in transcontinental traffic at the session in Chicago, this week and last, only succeeded in making a temporary arrangement for the government of business and the making of rates. The lines adopted a temporary tariff which will be on the following basis to San Francisco and common points: From New York, first class, \$3; from Chicago, \$3.40; from Missouri River points, \$3.10. The rates in this temporary tariff are about 60 per cent. of the ones recently in use, the rate from Chicago having been \$4. These rates will be used until after the next meeting, which will be held in Chicago, on May 15.

**East-bound Shipments.**

The shipments of all freight except live stock from Chicago through to seaboard points amounted last week to 30,057 tons, against 28,884 tons for the week previous, an increase of 1,173 tons. The percentages of the various roads were as follows: Baltimore & Ohio, 16.1; Chicago & Grand Trunk, 10.3; Pittsburgh, Cincinnati & St. Louis, 9.3; Lake Shore & Michigan Southern, 18.1; Michigan Central, 15.8; New York, Chicago & St. Louis, 8.8; Pittsburgh, Fort Wayne & Chicago, 20.8; Cincinnati, Indianapolis, St. Louis & Chicago, 0.8.

**ANNUAL REPORTS.****Atchison, Topeka & Santa Fe.**

The lines operated and controlled by this company at the close of the last fiscal year, ending Dec. 31, 1886, were:

1. The Atchison System, with a mileage in Missouri, Kansas, Colorado, New Mexico and Texas of 1,895.50 miles.
2. The Southern Kansas System, in Kansas and the Indian Territory, 630.30 miles.
3. The Chicago, Kansas & Western System, 401.23 miles.
4. The Sonora System, 350.19 miles.
5. The lines owned jointly with other companies, 192.08 miles.

The Atchison and Southern Kansas systems are operated together, and the figures given below are for those systems, 2,525.80 miles in all. There was an increase in the mileage during the year of 128.86 miles. The earnings for the year were as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Freight	\$11,100,987	\$10,873,631	I. 227,346	2.0
Passengers	4,026,005	3,889,411	I. 133,591	3.5
Mail & express	694,406	672,568	I. 21,838	3.2
Miscellaneous	162,929	135,795	I. 27,134	19.9
<b>Total</b>	<b>\$15,984,307</b>	<b>\$15,571,395</b>	<b>I. \$412,912</b>	<b>2.6</b>
Expenses	8,613,911	8,314,968	I. 298,943	3.5
Net earnings	7,370,396	7,256,427	I. 113,950	1.5
Gross earn. per mile	6.604	6.533	I. 71	1.1
Net	3,045	3,044	I. 1	...
P. c. of exp.	53.8	53.4	I. 0.4	...

Expenses include taxes, which last year amounted to 492,955.

The result of the year was as follows:

Net earnings as above..... \$7,370,396

Interest and miscellaneous..... 657,644

Total..... \$8,028,010

Pool payments..... \$73,226

Interest Atchison bonds..... 1,064,839

“ Southern Kansas bonds..... 339,820

“ bonds of leased roads..... 820,499

“ Leavenworth, Topeka & Southwestern bonds..... 27,600

“ Sonora bonds..... 283,500

Sinking funds..... 311,340

Rental of rolling stock..... 29,400

Dividends..... 3,738,478

Balance, surplus for the year..... \$739,316

The number of passengers carried one mile in 1886 was

176,810,489, at an average rate per mile of 2,277 cents, against 149,969,427 passengers carried one mile in 1885, at an average rate per mile of 2,593 cents.

Had the same average rates been received in 1886 as in 1885, the freight earnings would have been increased \$1,196,074.42, and the passenger earnings \$558,721.14.

The equipment includes 890 locomotives; 317 passenger cars; 10,895 freight cars; 29 sundry cars; total number of cars, 11,241.

The number of tons of freight carried one mile in 1886 was 687,309,093 against 607,758,550 tons one mile in 1885, and the average rate per ton per mile received in 1886 was 1.615 cents against 1.789 cents in 1885.

During the year the following amounts were expended in new construction, improvements, etc.:

Expenditures for additions and improvements to Atchison & Southern Kansas roads.....	\$482,638.61
Expenditure for real estate and permanent improvements charged to the account of auxiliary companies.....	398,666.40
Expenditure for the building of new roads commenced in 1885 and 1886.....	7,650,543.43
Other expenditures.....	121,518.49
Total.....	\$8,653,366.93

per mile, inclusive of the amount required in exchange for town and county bonds, which will become a valuable asset of the Atchison Company in the future."

**THE SOUTHERN KANSAS RAILWAY GULF DIVISION.**

"In accordance with Circular No. 58, issued in April, 1886, the Southern Kansas Railway Co. has been constructing its lines in the Indian Territory southerly in the direction of Denison and Fort Worth, Tex., and Southwesterly from Kiowa, Kan., in the direction of Wolf Creek to Carson County, in the Pan Handle of Texas; and the road in the Pan Handle is being constructed under the charter of the Southern Kansas Railway Co., of Texas. No portion of this mileage has yet been operated, but early in May connection will be made near the crossing of the Canadian River, 100 miles from Red River, with the Gulf, Colorado & Santa Fe Railway, which latter company has been building northward from Fort Worth to meet the extension southward from Arkansas City, Kan., of the Southern Kansas Railway Company. Distance across the Indian Territory, Arkansas City to the Red River, 252 miles.

"The Kiowa extension into Carson County in the Pan Handle—distance from the west line of Indian Territory, 90 miles, and from Kiowa, 217 miles—will be completed in July next."

**CHICAGO LINE.**

"Toward the close of the year, and after having given the matter for some time previous the most careful consideration, your directors unanimously came to the conclusion that the interests of this company required that it should have under its own control an independent line to Chicago.

"Nearly the entire system of a trunk line to the Missouri River, having Kansas City as a base, with feeders converging to the right and left, and all tributary to the Trunk Line.

"No other road leading into Chicago can hope to have so large and valuable a system of mileage located in this area of country; and this fact of itself will make a Chicago line of more value to the Atchison, Topeka & Santa Fe Railroad than to any other company.

"All the vast region covered by this system looks to Chicago as the main market from which it draws its supplies and dispose of its surplus product.

"None of the Chicago roads now in operation could have been purchased at a reasonable price, nor would any road now constructed fully meet our requirements.

"In view of these facts and conditions, it seems inevitable to your directors that the only safe course was to secure the building of a new line of road between Kansas City and Chicago; and in this resolve the largest stockholders whose opinion had been obtained concurred. The mileage of the new line will be about four hundred and fifty miles; which is about forty miles shorter than any of the existing lines between Kansas City and Chicago.

"It having been necessary to charter separate companies in Illinois and Iowa, the Chicago line is being built under the names of the Chicago, Santa Fe & California Railway Company and the Chicago, Santa Fe & California Railway Company of Iowa."

**Michigan Central.**

At the close of the last fiscal year ending Dec. 31, 1886, this company operated the following lines: Michigan Central system, 1,079.47 miles; Canada Southern system, 436.65 miles; total, 1,516.12 miles. In addition there are 120.93 miles of second main track and 569.15 miles of sidings, aggregating a total track mileage of 2,206.20 miles. The earnings for the year were as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Freight	\$7,938,572	\$6,906,207	I. \$1,032,365	14.9
Passengers	3,070,826	3,162,342	I. 508,484	16.0
Mail and express	577,919	546,996	I. 31,023	5.7
Miscellaneous	108,510	92,549	I. 15,961	17.2
Total	\$12,295,827	\$10,707,394	I. \$1,588,433	14.8
Expenses	8,494,679	8,014,003	I. 390,076	4.8

Net earnings..... 3,891,148 2,692,791 I. 1,198,357 44.5

Gross earn. per mile..... 8.113 7,091 I. 1,019 14.3

Net “ “ 2,568 1,814 I. 762 41.7

P. c. of exp. .... 68.3 74.8 D. 6.5 .....

Taxes are included in expenses; they amounted last year to \$258,288.

The result of the year's business was as follows:

Net earnings as above.....	..... \$3,891,148	..... \$3,891,148
Interest and rentals.....	..... 2,568	..... 2,568

Residue..... 1,314,164

Paid to Canada Southern its share of net income..... 407,335

Net revenue from traffic..... \$906,829

Income from investments..... 45,180

Total net revenue..... \$952,019

Dividend, 2 per cent..... 374,764

Balance to income account..... \$577,255

The traffic for the year was as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Pass carried	2,592,711	2,340,243	I. 252,495	10.7
Pass miles	171,317,751	153,573,988	I. 15,743,762	10.1

Ton freight carried.

Through..... 1,197,169 1,507,557 D. 310,388 20.5

Local..... 4,148,401 3,728,719 I. 419,682 13.8

Total..... 5,345,570 5,236,276 I. 109,294 2.0

Ton miles.

Through..... 548,864,235 706,771,478 D. 157,907,243 22.3

Local..... 608,546,769 525,706,056 I. 82,842,733 15.7

Total..... 1,157,413,024 1,232,477,534 D. 75,064,510 6.0

The condensed balance sheet is as follows:

Capital stock.....	..... \$18,738,204
Bond accounts.....	..... 16,976,000
Premium on Grand River Valley bonds sold.....	..... 1,633,327
Dividend payable.....	..... 191,250
Income account.....	..... 374,764
Total.....	..... 350,146

\$44,415,013

The funded debt has been changed as follows: The first mortgage bonds of the Grand River Valley Railroad Co., amounting to \$1,000,000 (the payment of which was guaranteed by this company in its lease of that road), bearing interest at 8 per cent. per annum, became due July 1, 1886 and were paid. They were replaced by bonds of this company bearing interest at 6 per cent. per annum, issued as of March 1, 1886, and with a similar issue bearing date of Sept. 1, 1879, for \$500,000, constitute one debt of \$1,500,000, which is secured by a general first mortgage on the property of the Grand River Valley Co. The total funded debt of this company is, therefore, increased \$1,000,000, while its Leased Line Debt is correspondingly decreased.